Final
Environmental Impact Statement

Salmon-Challis National Forest Noxious Weed Management Program

Prepared for

U.S. Forest Service

September 2003

CH2MHILL

Final
Environmental Impact Statement

Salmon-Challis National Forest Noxious Weed Management Program

Prepared for

U.S. Forest Service

September 2003

CH2MHILL

United States Department of Agriculture | Forest Service | Salmon-Challis National Forest Supervisor's Office | 50 Hwy 93 S
Salmon, ID 83467
208 756-5100

File Code: 1950-3
Date: September 15, 2003

Dear Reader:

Enclosed is the Final Environmental Impact Statement (FEIS) for the Salmon-Challis National Forest Noxious Weed Management Program. The FEIS describes and analyzes four alternatives for the treatment of noxious and non-native invasive weeds throughout the Salmon-Challis National Forest excluding the Frank Church River of No Return Wilderness.

Public scoping for this project was initiated in the winter of 2001. The issues identified through scoping included the potential effects of herbicide application on human health, water quality, fisheries, native plant communities, sensitive plants, wildlife habitat, soil productivity, recreation, scenery, heritage resources, and cultural resources. Four alternatives were developed following the concept of Integrated Weed Management (IWM). Three alternatives include the use of herbicides, one of which includes the use of aerial herbicide application. The fourth alternative considers no herbicide use. The maximum annual treatment evaluated in the alternatives is 18,000 acres including application of herbicide on up to 15,000 acres.

A Draft Environmental Impact Statement (DEIS) was developed and distributed to agencies, governments, and the public in November 2002, for a 60 day comment period. This FEIS considers and incorporates comments received on the DEIS. No further public review or comment opportunities are provided.

The Selected Alternative is currently being consulted on with the US Fish and Wildlife Service and NOAA-Fisheries (National Marine Fisheries Service). Once consultation is complete, a Record of Decision (ROD) will be signed by the Forest Supervisor and made available to the public.

Any immediate questions may be directed to Bill Diage at (208) 756-5562 or e-mail wdiage@fs.fed.us.

Sincerely,

Lesley W. Thompson
LESLEY W. THOMPSON
Acting Forest Supervisor

Enclosure

Data Accuracy—The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created revised, etc. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. For more information, contact:

Salmon-Challis National Forest
50 Highway 93 South
Salmon, Idaho 83467

If a map contains contours, these contours were generated and filtered using the Digital Elevation Model (DEM) files. Any contours generated from DEMs using a scale of less than 1:100,000 will lead to less reliable results and should only be used for display purposes only.

Data Accuracy -- The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. For more information, contact:

Salmon-Challis National Forest
50 Highway 93 South
Salmon, Idaho 83467

If a map contains contours, these contours were generated and filtered using the Digital Elevation Model (DEM) files. Any contours generated from DEMs using a scale of less than 1:100,000 will lead to less reliable results and should only be used for display purposes.

Salmon-Challis National Forest Noxious Weed Management Program

Final Environmental Impact Statement

Salmon, Idaho

Responsible Agency: USDA FOREST SERVICE

For Further Information, Contact: William Diage

50 Highway 93 South

Salmon, Idaho 83467

Cover Sheet

Salmon-Challis National Forest Noxious Weed Management Program

( ) Draft (X) Final

Responsible Agency

U.S. Department of Agriculture, Forest Service

Cooperating Agencies

Cooperative Weed Management Areas (CWMAs)
Custer County CWMA
Lemhi County CWMA
Lost Rivers CWMA (Butte and Custer Counties)
Continental Divide CWMA (Lemhi, Butte, Jefferson, and Clark Counties)

Shoshone-Bannock Tribes

U.S. Department of Commerce, National Marine Fisheries Service

U.S. Department of the Interior, Bureau of Land Management
Challis Field Office
Salmon Field Office

U.S. Department of the Interior, Fish and Wildlife Service

Counties that Could be Affected

Custer, Lemhi, Butte, and Blaine, Idaho

Abstract

This Final Environmental Impact Statement (Final EIS) covers the proposed Noxious Weed Management Program for the Salmon-Challis National Forest (S-CNF). The project area covers more than three million acres of the S-CNF, excluding the Frank Church River of No Return Wilderness (FCRONRW), and includes existing as well as future potential weed infestation sites. There is a need to implement an integrated series of weed treatment and non-treatment practices that would eradicate, reduce, and/or slow the spread of noxious and invasive non-native populations of weeds on the S-CNF. Inventoried weed infestations on the S-CNF now exceed 66,000 acres at more than 2,500 sites. Extensive populations of spotted knapweed are present on the northern part of the S-CNF. Weed management alternatives evaluated in this Final EIS include the following:

No Action Alternative— (No Change from Current Management)

Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments

Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)

Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

The Forest Service has selected the Proposed Action as the Preferred Alternative based on analyses presented in this Final EIS. The Proposed Action, followed by Alternative 1, would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources. The No Action Alternative would be less effective and Alternative 2 would be the least effective of the alternatives evaluated in treating weeds and in benefiting S-CNF resources because of the comparatively few acres of weeds that would be treated each year (No Action Alternative) and the absence of herbicides as a weed treatment option (Alternative 2). The Proposed Action best meets all of the project purposes and needs, contains the most aggressive and flexible treatment practices for achieving noxious weed management goals, and would provide the greatest weed treatment benefits at the lowest cost per acre.

Environmental issues evaluated in this Final EIS involve the following topics: vegetation resources and noxious weeds; aquatic resources; wildlife resources; ecosystem function; surface water; groundwater; soils, geology, and minerals; land uses and designations; visual resources; air quality and noise; human health and safety; Indian Trust Assets; environmental justice; socioeconomic resources; cultural and historical resources and Native American religious concerns; and paleontological resources.

Other Requirements Served

This Final EIS is intended to serve other environmental review and consultation requirements pursuant to 40 CFR 1502.25(a).

Date Draft EIS Made Available to EPA and the Public:

November 15, 2002

Date Final EIS Made Available to EPA and the Public:

September 24, 2003

Contents

Appendices

Tables **Page**

Figures **Page**

Maps		Page

Executive Summary

ES.A. Introduction

This Final Environmental Impact Statement (Final EIS) was prepared pursuant to requirements of the National Environmental Policy Act (NEPA) for the Salmon-Challis National Forest (S-CNF) Noxious Weed Management Program. The S-CNF proposes to implement an integrated series of weed treatment practices that would eradicate, reduce, and/or slow the spread of noxious and invasive non-native populations of weeds on the S-CNF. The project area covers more than three million acres of the S-CNF, excluding the Frank Church River of No Return Wilderness (FCRONRW), and includes existing as well as future potential weed infestation sites. Map ES-1 shows the boundaries of the S-CNF and its location in Idaho.

More than 40 weed species are considered in this analysis, including species designated as "noxious" by the State of Idaho and additional invasive species found on or near the S-CNF. Weed species that occur on the S-CNF are referred to as established or new invaders, while those that occur near the S-CNF are referred to as potential invaders.

ES.B. Purpose and Need

ES.B.1. Project Purpose

The purposes of the proposed S-CNF Noxious Weed Management Program are to:

1. Protect the natural condition and biodiversity of ecosystems and watershed function within the S-CNF by preventing and/or limiting the introduction and subsequent spread of invasive, non-native plant species that displace native vegetation.

2. Eliminate new invaders (weed species not previously reported in an area) before they become established.

3. Contain and reduce known and potential weed seed sources throughout the S-CNF.

4. Prevent or limit the spread of established weeds into areas containing little or no infestation.

5. Protect sensitive and unique habitats including Research Natural Areas (RNAs), wetlands, riparian areas, and plant populations.

6. Develop criteria to prioritize invasive weed species and treatment areas. Use these criteria to identify priority weed treatment locations within the S-CNF.

7. Comply with and implement current Federal and State law, Presidential Executive Orders, Forest Service policy and strategies, and Forest Service plans regarding the control of noxious and other invasive, non-native weeds.

8. Cooperate with county, state, other federal agencies, and private land owners, and other organizations (including Cooperative Weed Management Areas [CWMAs]) interested in managing invasive weeds.

The Notice of Intent (NOI) to prepare this EIS stated that prioritization would be given to treating areas that may contribute to the continuing spread of weeds into Lemhi, Custer, and Butte Counties within the S-CNF.

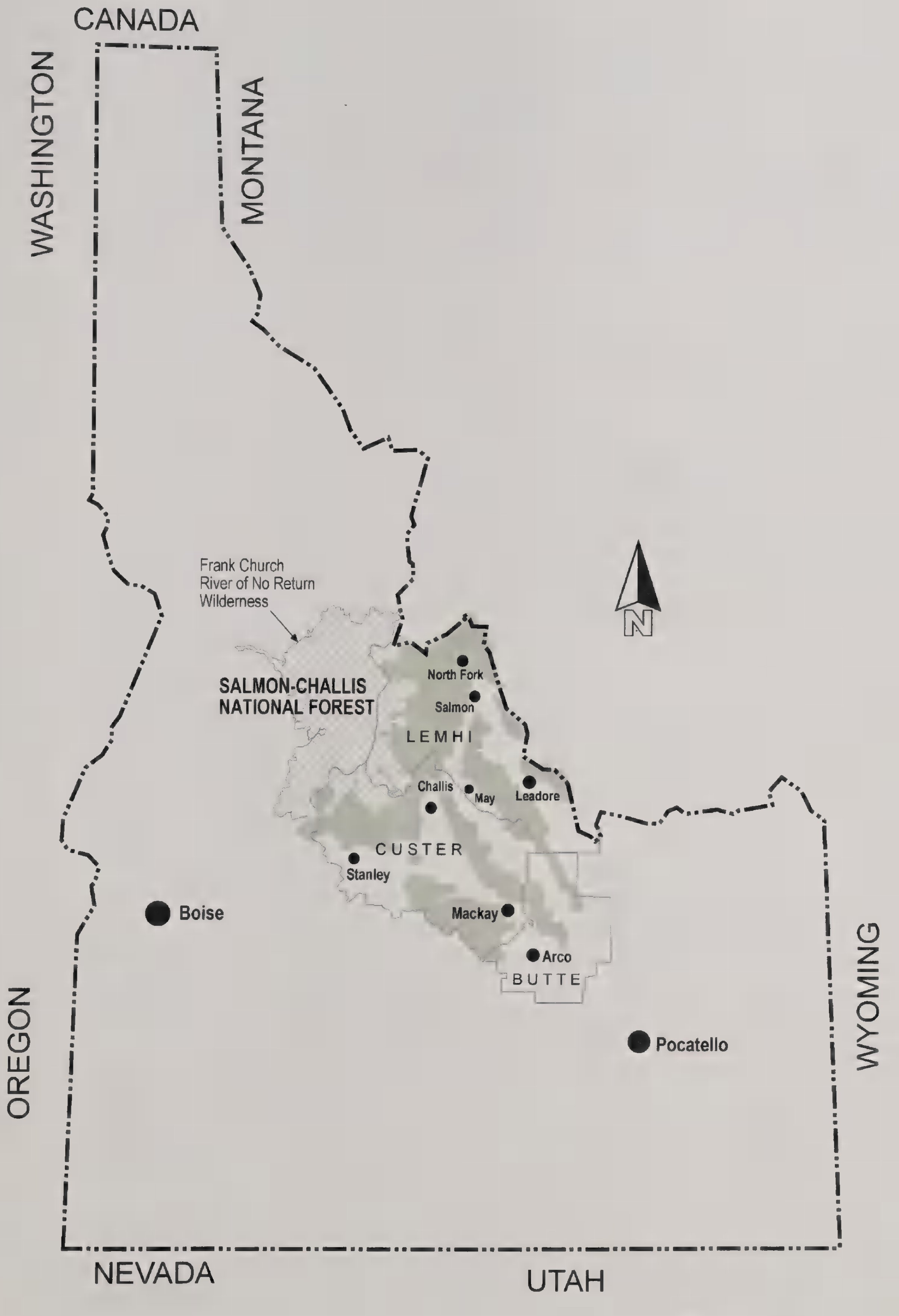
ES.B.2. Project Need

According to the recent scientific assessment of the Interior Columbia Basin, invading weeds can alter ecosystem processes, including productivity, decomposition, hydrology, nutrient cycling, and natural disturbance patterns such as frequency and intensity of wild fires (Quigley and Arbelbide 1997). Changing these processes can lead to displacement of native plant species, eventually impacting wildlife and native plant habitat, recreational opportunities, natural hydrologic processes, and scenic beauty.

Noxious and invasive, non-native weeds are spreading on public and private lands at an alarming rate. The Departments of Agriculture in 11 western states estimate that there are about 70,000,000 acres of invasive weeds on private, state, and federal wildlands (Asher and Spurrier 1998). At an average annual rate of spread of 14 percent (U.S. Bureau of Land Management 1985), the 70,000,000 acres of weed infestations would lead to 3,500,000 acres of new weed infestations in 1 year. The spread of weeds can primarily be attributed to human activities associated with vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and ineffective re-vegetation practices on disturbed lands (Callihan et al. 1991). Wind, water, birds, wildlife, and livestock also contribute to weed spread.

Noxious and undesirable weeds have established themselves throughout the Northwest, including the S-CNF where nine species with established populations and 15 species with new populations are known to infest more than 66,000 acres on more than 2,500 sites. It is likely many more infestations are yet to be discovered. The North Fork Ranger District contains the greatest number of weed species (16) and acres of weed infestations (54,638) among the seven S-CNF Ranger Districts, followed by the Salmon-Cobalt Ranger District (13 species; 8,182 acres). Weed infestations on these two Ranger Districts together comprise approximately 94 percent of all inventoried noxious weed infestations on the S-CNF. The three most abundant weed species (acres of infestations) within each S-CNF Ranger District are represented by a total of seven species. They include spotted knapweed, musk thistle, Canada thistle, bull thistle, leafy spurge, yellow toadflax, and sulphur cinquefoil.

Many weed species reproduce by sprouting from roots as well as by prolific seed production. Quigley and Arbelbide (1997) make reference to colonizer and invader noxious weeds. Colonizers tend to germinate under a wide range of environmental conditions, establish quickly, exhibit fast seedling growth, and, once established, out-compete native species for water and nutrients. Invaders can establish on relatively intact vegetative cover and displace native species without the aid of soil surface disturbance. Many of the most insidious noxious weed species (knapweeds, leafy spurge, rush skeletonweed, and yellow starthistle) have characteristics of both colonizers and invaders.



MAP ES-1
Salmon-Challis National Forest
Location Map

THIS PAGE LEFT INTENTIONALLY BLANK

Most habitat criteria for weeds are fairly broad, which is one of the characteristics that makes these species so successful in adapting to new environments. Other general characteristics that often aid in the invasion and spread of weeds are their high reproductive potentials; adaptations to disturbed sites; allelopathic (toxic) compounds that provide weeds a competitive edge by suppressing growth of other vegetation; poisonous compounds, latex sap, barbs, or prickles that make weeds unpalatable; and/or their lack of natural enemies outside their native country and range. Because of the ability to invade or colonize new areas and a lack of natural predators to keep them in check, weeds can spread rapidly to non-infested areas.

Noxious and invasive weed expansion and establishment does not recognize ownership or administrative boundaries. Weeds that have become established on roadways are likely to encroach upon adjacent private croplands. Infestations on private lands are likely to encroach upon public lands and vice versa. The economic effects on private land productivity and treatment costs are considerable. This Final EIS lists the species and acres of noxious weeds inventoried just outside the S-CNF boundaries that are associated with the S-CNF Ranger Districts. The presence of these weeds was documented as part of the overall database compilation for the proposed Noxious Weed Management Program on the S-CNF. Gathering near-Forest data such as these contributes to the cooperative weed management programs involving the Forest Service and neighboring counties like Custer County and Lemhi County, and is integral to the overall success of weed management on and near the S-CNF. As more inventories are completed, weed acres and distribution will surely increase.

The degradation of public land resource values because of noxious weed infestations also has economic impacts. A study on the impact of spotted knapweed on Montana's economy (Hirsch and Leitch 1996) found that spotted knapweed infestations in wildlands have affected wildlife-associated recreation expenditures and soil and water conservation benefits. The direct impact on Idaho's economy has been estimated at more than $300 million annually (Idaho Strategic Plan for Managing Noxious Weeds, Idaho Department of Agriculture February 1999).

Data presented in this Final EIS indicate how quickly weeds could potentially spread and dominate the S-CNF under the No Action Alternative. Five years from now, presently known weed infestations of approximately 66,000 acres would have doubled or tripled in size. Ten years from now, weeds would cover from over 200,000 acres (14 percent annual spread) to over 500,000 acres (24 percent annual spread) of the S-CNF. Twenty years from now, weeds would cover from just under 1,000,000 acres of the S-CNF at the most conservative spread rate (14 percent) to all of the S-CNF lands at the risk of invasion at the least conservative spread rate (24 percent).

These estimates are a sobering prediction of what could occur if treatment efforts remain at current levels.

Noxious weeds negatively impact the natural plant communities they invade by reducing plant diversity and species richness, by decreasing the quality of habitat values for wildlife, and by overwhelming sensitive plant populations. Without aggressive treatment, noxious weeds would continue to displace native vegetation at the same or higher rates than currently. This would mean continued declines in plant diversity and species richness across native plant communities, particularly in the northern districts of the S-CNF where

current infestations are heaviest. Declines in natural vegetative communities would result in declines in the quality of wildlife habitats. Populations of sensitive plant species in the path of weed expansion that could be expected to occur under less aggressive treatment would be impacted and probably overwhelmed by noxious weeds. Sensitive plant populations that are within or along the perimeter of the currently infested areas would have the highest potential to be negatively impacted.

The S-CNF must exercise responsible land management to prevent weed infestations from causing substantial habitat loss, with subsequent loss of plant diversity and ecosystem functions. Lack of effective weed management, in conjunction with the land use patterns around and within the S-CNF, will result in continued infestation onto Federally administered land from non-Federal land. Conversely, lack of effective weed management on some Federally administered land may infest neighboring non-Federal land or render weed control efforts on adjacent non-Federal land ineffective.

ES.C. Alternatives Analyzed in Detail

A Proposed Action, two other action alternatives, and a No Action Alternative for the proposed S-CNF Noxious Weed Management Program were analyzed in detail. They are described below and include the following:

- No Action Alternative (No Change from Current Management)
- Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments
- Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)
- Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

The Proposed Action was selected by the S-CNF Weed EIS Content Analysis Team following further review of the six preliminary alternatives presented at the public scoping meetings, evaluation of comments received from the public on alternatives and components of alternatives for the proposed project, and an assessment of which action alternative appeared to best meet the near- and long-term weed management goals for the S-CNF as defined in the project purposes and needs. For each alternative analyzed in detail, vegetative treatments were combined with site restoration activities rather than keeping them as a separate set of weed treatments, because vegetative treatment (in some form) becomes the restoration action.

In addition to the features of the alternatives described below, best management practices (BMPs), standard operating procedures (SOPs), and mitigation measures will be implemented under the various alternatives. These measures are described in detail in Chapter 2 of this Final EIS. Many measures apply to all alternatives and involve safe operating procedures for weed control.

ES.C.1. No Action Alternative (No Change from Current Management)

Under the proposed S-CNF Noxious Weed Management Program, the No Action Alternative would continue the same weed management programs, treatments, and levels of effort for controlling noxious weeds on the S-CNF as are currently being used. Current weed management is conducted according to the Forest Service's Integrated Weed Management (IWM) Program, and is authorized by the Findings of No Significant Impact (FONSI), Decision Notices, and Environmental Assessments for the Challis National Forest (U.S. Forest Service 1989) and Salmon National Forest (U.S. Forest Service 1987a) noxious weed control programs. Weed treatments on the S-CNF were very limited prior to 1995. Since then, acres of lands treated have generally increased each year from 586 acres in 1995 to 3,371 acres in 2001. Virtually all of these acreages were treated using herbicides. Monitoring has been geared toward program implementation and measuring the effectiveness of treatments on target species.

The current noxious weed management program for the S-CNF fulfills the need to develop relationships with local and state agencies and complies with current federal and state laws. However, recent watershed analyses show that weed infestations continue to plague the S-CNF. The current level of weed treatment is considerably less than known weed infestations (greater than 66,000 acres) on the S-CNF. New invaders continue to establish populations on the S-CNF, and would likely increase in size unless a more aggressive noxious weed management program than that associated with the No Action Alternative is developed and implemented.

The No Action Alternative does not include a forest-wide integrated action plan to reduce or eliminate the spread of weeds on the S-CNF. It also does not include an adaptive weed management strategy or a minimum tool approach. Site restoration and monitoring activities would be limited in scope. Expanding target species, treatment acres, or choice of chemical would require further NEPA analysis and documentation. This would constrain S-CNF managers from responding in a timely and cost-effective manner to new weed infestations.

ES.C.2. Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments

a. Weed Treatment Objectives and Priorities

The overall management objective of the Proposed Action is to maximize the treatment of noxious and invasive weeds throughout the S-CNF using an IWM approach as quickly as reasonably possible to protect the forest and its resources. This strategy is a holistic, *systems* approach to weed management. It involves the use of the best available management techniques to limit the impact and spread of the weed. IWM typically includes strategies for awareness and education, early detection and proactive prevention of noxious weeds, the use of all treatment "tools" such as mechanical, biological, controlled grazing, and chemical management practices, followed by restoration and revegetation (cultural) (as appropriate) and monitoring of weed-impacted lands. A full array of treatment and management strategies is important in IWM, including weed treatment and non-treatment practices,

prevention, restoration, monitoring, adaptive strategy, minimum tool, and site-specific implementation process. These strategies are discussed below and throughout this Final EIS.

Weed treatment objectives under the Proposed Action of an IWM approach include eradication (elimination), control (reducing the population over time), and containment (preventing the population from spreading). Weed treatment priorities would be directed to where they have the greatest potential for removing or minimizing the adverse effects of weeds on other S-CNF resource values. Treatment priorities, in descending order, are as follows:

1) Eradicate new populations of aggressive weeds
2) Control existing populations of aggressive weeds
3) Contain existing populations of aggressive weeds
4) Eradicate new populations of less aggressive weeds
5) Control existing populations of less aggressive weeds
6) Contain existing populations of less aggressive weeds

Levels of S-CNF funding, staffing, and other resource availability would ultimately determine the schedule for addressing and implementing treatment priorities. If funding and staffing levels are inadequate for full implementation of the IWM program, treatment at a specific weed site may be deferred. This is defined as a "custodial" action.

b. Weed Treatment Practices

The Proposed Action includes a full array of integrated weed treatment practices: restoring and revegetating (where appropriate) sites; developing monitoring programs to follow treatment; implementing a broad range of mitigating BMPs and SOPs; employing a site-specific minimum tool approach; and following an adaptive strategy in managing future weed infestations. Options for weed treatment that would be considered for use on a site-specific basis under the Proposed Action include a variety of mechanical, biological, controlled grazing, chemical (ground-based and aerial applications of herbicides), and combinations of these treatments. A number of non-treatment practices, which are a cornerstone of IWM programs, would continue under the Proposed Action. These IWM practices include proactive weed prevention programs; weed inventory and early detection; information and education programs; cooperative partnerships and coordination; and compliance with laws, orders, policies, and Forest Plans. Weed treatment practices are described in detail in *Section 2.C.1, Treatment Practices.*

c. Mitigating BMPs and SOPs

BMPs for weed prevention and management that are followed by Region 4 of the Forest Service would be adhered to under the Proposed Action. In addition, BMPs and SOPs specifically associated with non-chemical weed treatments and with the ground-based and aerial applications of herbicides would be implemented as integral parts of the Proposed Action. These BMPs and SOPs are intended to avoid, minimize, or offset the potential for adverse impacts on S-CNF resources. Mitigating BMPs and SOPs are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures,* and Appendix A.

d. Restoration and Monitoring

Restoration and monitoring of treatment areas are integral components of the IWM program. Site restoration objectives include revegetating areas with desired vegetation where weeds have been eradicated, controlled, or contained; preventing future weed infestations; and slowing expansion of existing adjacent weed infestations. Implementation and effectiveness monitoring of treated and restored sites would be used to determine if the desired management objectives are being achieved, whether site restoration was successful, if follow-up treatments are needed, and to validate buffering effectiveness. Restoration and monitoring are described in detail in *Section 2.C.3, Restoration and Monitoring.*

e. Adaptive Strategy

An adaptive weed management strategy would be employed to determine appropriate future actions to treat new populations of weeds, expansion of existing weed infestations, or weed infestations that have not yet been inventoried. The adaptive strategy would also cover any new weed species that occur on the S-CNF; any new federal-, state-, or county-designated species of noxious weeds; and any non-designated nuisance weeds present on the S-CNF. The process would include the following: 1) determine the weed species, level of aggressiveness, and infestation size; 2) determine the proximity to susceptible habitats, sensitive resources or species, administrative, or recreation sites; 3) determine a treatment priority level; 4) select and implement a treatment method using the site-specific minimum tool concept; and 5) conduct site restoration, monitoring, and assess follow-up needs. The scope of this EIS is intentionally broad relative to the issues and geographic scale analyzed in order to establish a basis for covering future weed treatments on the S-CNF using an adaptive strategy. Adaptive strategy is described more fully in *Section 2.C.4, Adaptive Strategy.*

f. Minimum Tool

Invasive weed treatments will incorporate the use of the "minimum tool" concept. During planning, S-CNF managers will select for use the minimum necessary method(s) to accomplish the weed management objectives at a specific site. If all treatment options are equally effective in controlling a particular species or infestation, the method with the least impact would be used. Parameters considered when selecting minimum tools include species biology, infestation size, proximity to water and recreation sites, and extent of sensitive habitats adjacent to infestations. The minimum tool would be determined using a site-specific implementation process and decision tree analysis that evaluates environmental parameters. Minimum tool is described in detail in *Section 2.C.5, Minimum Tool.* The site-specific implementation process and decision tree analysis is summarized in the following text.

g. Site-Specific Implementation Process

A number of steps would be followed under the Proposed Action and Alternatives 1 and 2 to determine and implement the most appropriate treatment method for a site-specific weed infestation. They include the following:

- Detection of the weed
- Prioritization of weed treatment at a particular site

- Determination if sensitive environmental receptors are present
- Determination of the appropriate treatment method for the weed
- Restoring then monitoring the treatment site to determine if follow-up or alternative treatment is warranted.

Following detection of a weed or weed population, treatment prioritization would take place. Highest priority would be given to stopping potential invaders before they can become established on the S-CNF. New invaders, usually having a small patch size, would have the second highest priority, followed by established invaders. The degree and intensity of treatment recommended is based on the importance the S-CNF places on limiting the spread of each weed species and the size of the infestation.

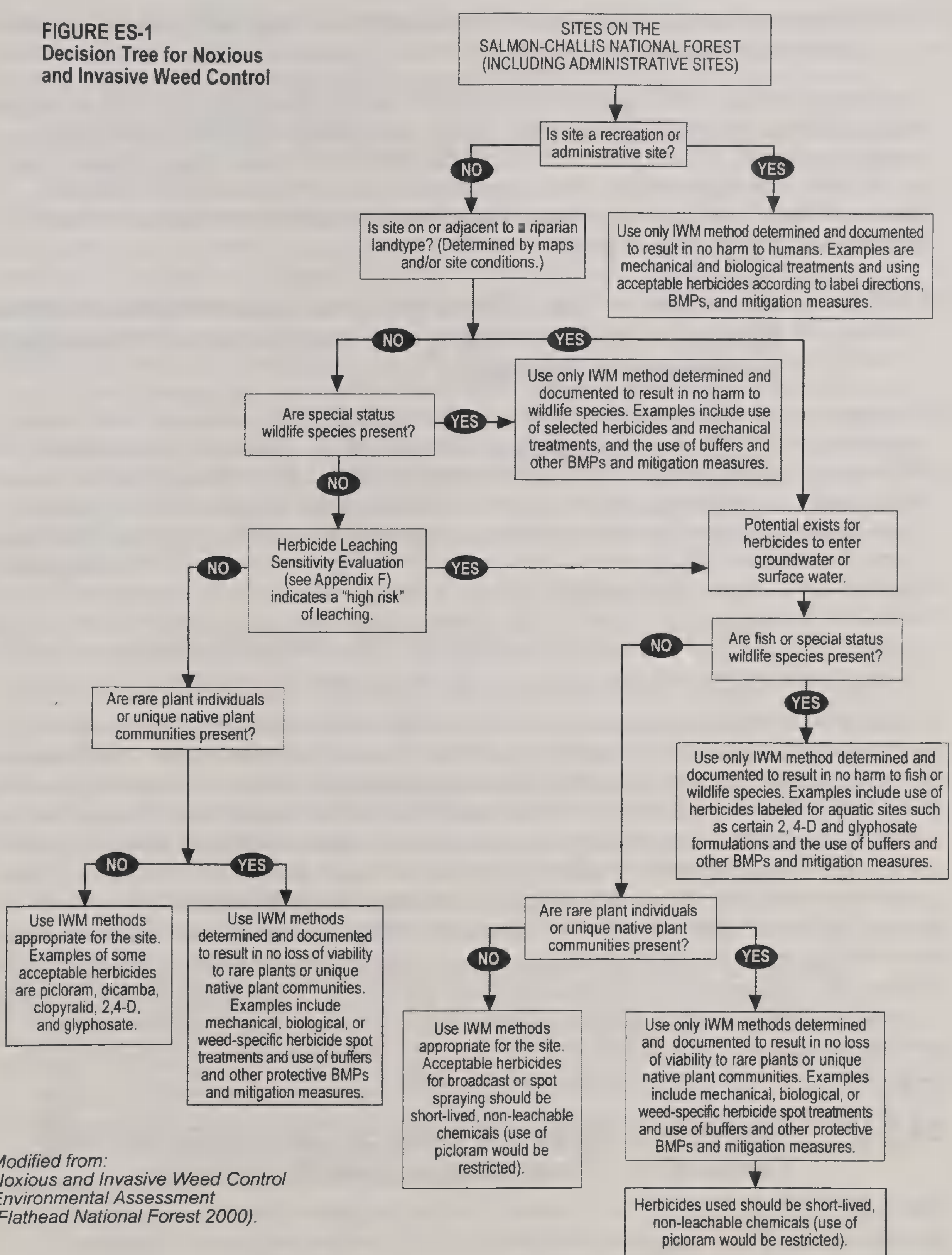
After the weed treatment priority and objective have been determined for a specific infestation, a decision tree (Figure ES-1) would be used as a guide to determine the most appropriate treatment method (mechanical, biological, controlled grazing, chemical, or combinations). This site-specific approach to treating weed infestations embraces the minimum tool concept. It is designed for present use as well as future use under the adaptive weed management strategy. This approach also incorporates all of the identified BMPs and SOPs, depending on the alternative. The site-specific process is described in detail in *Section 2.C.6, Site-Specific Implementation Process.*

h. Weed Treatment Acres, Sites, and Management Goals

Table ES-1 summarizes the acres of weed infestations on the S-CNF that would be treated annually under the Proposed Action (as well as under the No Action Alternative and Alternatives 1 and 2) using various available treatment options. The expected time frames and goals for accomplishing the Proposed Action management objective would vary depending on the extent and severity of weed infestations. As discussed in Chapter 2, known acres of weed infestations are considerably greater on the North Fork and Salmon-Cobalt Ranger Districts (primarily spotted knapweed infestations) than on the other five S-CNF Ranger Districts and may require more time to achieve weed management goals. The following management goals are proposed for the S-CNF Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100 percent.
- Reduce established infestations of aggressive weeds greater than 25 acres in size by 50 percent.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.

FIGURE ES-1
Decision Tree for Noxious and Invasive Weed Control



Modified from:
Noxious and Invasive Weed Control Environmental Assessment (Flathead National Forest 2000).

- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment under the Proposed Action would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. Future, presently undefined weed infestations would be treated using the adaptive strategy approach. For purposes of analysis in this Final EIS, it has been assumed that full funding would be available for implementing the Proposed Action to work toward achieving those goals.

E.S.C.3. Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)

The management objective of Alternative 1 is similar to the Proposed Action, except that it would not include the aerial application of herbicides and is, therefore, less aggressive than the Proposed Action (see Table ES-1). The approximately 15,000 acres per year that would be chemically treated from both ground and air applications under the Proposed Action would instead be treated under Alternative 1, to the extent possible, using a combination of ground-based herbicide application plus primarily biological treatments. This affects the time frame and degree of success that would be anticipated on large infestations of weeds in the S-CNF. Except for this difference, all other integrated weed treatment and non-treatment practices, prevention, restoration and monitoring, adaptive strategy and minimum tool, and the site-specific implementation process would be implemented under Alternative 1.

Proposed weed management goals would be similar to the Proposed Action except for established infestations of aggressive weeds 5 to 25 acres in size and greater than 25 acres in size in all Ranger Districts. Differences in management goals between Alternative 1 and the Proposed Action would be greatest in the North Fork and Salmon/Cobalt Ranger Districts where the largest and continuous blocks of weed infestations suitable for aerial application are located. A combination of biological and ground-based chemical methods rather than aerial herbicide application would be used to treat the numerous large infestations of spotted knapweed. These large weed infestations would be more difficult to access and the treatment less effective, and would require more time to treat compared to aerial herbicide applications. The period of weed treatment for Alternative 1 would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. It is assumed that full funding would be available for implementing Alternative 1 to work toward achieving those goals.

ES.C.4. Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

The objective of Alternative 2 is to increase the level of noxious weed management throughout the S-CNF compared to current conditions using mechanical, biological, controlled grazing, and combinations of these treatments. Except for the exclusion of herbicides, integrated weed treatment and non-treatment practices, prevention, restoration and monitoring, adaptive strategy and minimum tool, and the site-specific implementation process would be implemented under Alternative 2 (see Table ES-1). Herbicides would not

be applied under Alternative 2, and they would not be authorized for future use in the adaptive weed management strategy under this alternative. This would limit the choice and in most cases the effectiveness of treatments available for various species and sizes of noxious weed infestations. It would also limit the flexibility to select from a wide range of treatment options if initial treatments are unsuccessful and re-treatments with a different option are necessary.

The expected time frames and goals for accomplishing the management objective would vary depending on the extent and severity of weed infestation—the same as noted for the Proposed Action and Alternative 1. However, it is anticipated that because of fewer treatment methods available for use under Alternative 2 it is not likely that the same level of success would be achievable as the Proposed Action and Alternative 1. This is especially true for the North Fork and Salmon/Cobalt Ranger Districts where weed infestations are considerably greater than on the other five S-CNF Ranger Districts. The period of weed treatment for Alternative 2 would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. In many cases where a reduction in the size of infestation is possible under other alternatives, only controlling or containing the infestation is realistic under Alternative 2, without the use of herbicides. It is assumed that full funding would be available to work toward achieving those goals.

ES.D. Comparison of the Effects of Alternatives

Table ES-2 (back of Executive Summary) compares and contrasts important features, properties, benefits, and costs of the No Action Alternative, Proposed Action, and Alternatives 1 and 2. Table ES-2 provides summary information for each of these four alternatives on noxious weed management goals, degree to which the eight components of project purpose and need would be met, and components of the IWM Program that would be implemented, including treatment practices, site restoration and monitoring, adaptive strategy, minimum tool approach, and site-specific implementation process. Table ES-2 concludes with a summary of estimated annual total treatment cost, estimated annual average cost per acre treated, and cost versus benefit for each alternative.

Table ES-3 (back of Executive Summary) summarizes and compares the potential environmental benefits and impacts of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2 for each resource area. The Proposed Action, followed by Alternative 1, would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources. The No Action Alternative (No Change from Current Management) would be less effective and Alternative 2 would be the least effective of the alternatives evaluated in treating weeds and in benefiting S-CNF

TABLE ES-1
Estimated Acres of Weed Infestations to be Treated Annually and Possible Treatment Options on the S-CNF for the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2[1,2,3]

	Possible Treatment Options									
	Mechanical	Biological	Chemical	Mechanical and Chemical	Biological and Chemical	Grazing and Chemical	Mechanical and Biological	Mechanical and Grazing	Biological and Grazing	Total Acres
No Action Alternative	50	550	2,350	50	500	0	0	0	0	3,500
Proposed Action	100	2,600	13,600	100	1,200	100	100	100	100	18,000
Alternative 1	100	2,600	7,000	200	7,600	200	100	100	100	18,000
Alternative 2	2,000	8,000	0	0	0	0	6,000	500	1,500	18,000

[1]Excludes the Frank Church River of No Return Wilderness.
[2]Estimated treatment acres based on values contained in Appendix B and information contained in Appendices C and J.
[3]Estimated treatment acres for the No Action Alternative reflect current and anticipated trends.

resources because of the comparatively few acres of weeds that would be treated each year (No Action Alternative) and the absence of herbicides as a weed treatment option (Alternative 2).

Potential risks for some S-CNF resources were identified for those alternatives that would use herbicides to treat weeds. These include aerial and ground-based herbicide applications under the Proposed Action and ground-based herbicide applications under Alternative 1 and the No Action Alternative. Such risks would be non-existent under Alternative 2. In all instances involving herbicide and other potential risks, BMPs and mitigation measures would be implemented to avoid or minimize the potential for adverse effects to occur. In addition, the Proposed Action, Alternative 1, and Alternative 2 include the use of a site-specific implementation process and a decision tree, a minimum tool approach, and an adaptive strategy. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment option that achieves weed management goals with the least impact on S-CNF resources. The protection of worker health and safety and public health and safety in selecting and implementing a site-specific treatment option would receive the very highest priority.

ES.E. Selection of the Preferred Alternative

The Forest Service has selected the Proposed Action as the Preferred Alternative based on the analyses presented in this Final EIS. Among the alternatives evaluated, the Proposed Action best meets all of the project purposes and needs, contains the most aggressive and flexible treatment practices for achieving noxious weed management goals, and would provide the greatest weed treatment benefits at the lowest cost per acre. The Proposed Action would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources.

ES.F. Environmentally Preferred Alternative

The Forest Service has identified Alternative 2 as the Environmentally Preferred Alternative. This recognition is based on its lack of herbicide use and their potential impacts to the environment. However, Alternative 2 is also recognized as being the least effective of the alternatives evaluated in controlling noxious and non-native invasive weeds, thus having the greatest long-term impacts to native plants, wildlife habitat, and ecosystem health. While Alternative 2 is Environmentally Preferred in the short-term, the Proposed Action is expected to result in the greatest environmental benefits over the long-term and was therefore selected as the Preferred Alternative.

ES.G. Public Involvement, Consultation, and Coordination

Public involvement formally began with the publication of a NOI to prepare a Draft EIS for a proposed noxious weed management program on the S-CNF, excluding areas within the Frank Church River of No Return Wilderness (FCRONRW). The NOI was published in the Federal Register on December 14, 2001. A project scoping letter was mailed to 502 individuals, interest groups, local governments, and other agencies on December 18,

2001. The Shoshone-Bannock Tribes were sent a notice on January 15, 2002, describing the project and requesting input.

Three public scoping meetings were held in the three local communities surrounding the project area in early January 2002. The first scoping meeting was in Arco, Idaho, on January 8, the second in Challis, Idaho, on January 9, and the third in Salmon, Idaho, on January 10. Notices of the public meetings appeared in the three local newspapers (Arco Advertiser, Challis Messenger, and Salmon's Recorder Herald) during the week of December 24, 2001. Notices of the public meetings also were announced over the local radio stations in Salmon and Challis the week of January 1, 2002. The meetings were only lightly attended by the public, including three individuals in Arco, six in Challis, and one in Salmon. Most of the attendees provided written comments either during the meeting on the comment form provided or by mail (and/or e-mail) at a later date. Notes describing issues and concerns raised by the public were recorded at each meeting and a sign-in list was distributed.

A total of 25 individuals or organizations responded with 88 written comments on the proposed project as a result of public scoping. Based on comments received from the public during and following scoping meetings, there appears to be little opposition regarding the use of chemicals or livestock as weed treatment options on the S-CNF. In addition, it appears there is support for using the full array of weed treatment options and the need to include provisions for chemical use, acreage, and treatment site flexibility on the S-CNF.

Although there is acceptance to the use of chemicals in the treatment of noxious weeds, there is still a concern over the environmental and health risks herbicides pose. However, in general, the public recognizes that noxious weeds pose a greater threat to the physical, biological, and ecological environment of the S-CNF. These environmental and health concerns led to the development of the following issues:

1. Potential effects on wildlife habitat, fisheries, native plant communities, threatened/endangered/sensitive (TES) species, vegetation diversity, and ecosystem function because of noxious weeds.

2. Potential effects on wildlife species and their habitat from ground and aerial applications of herbicides.

3. Potential effects on fisheries and aquatic habitat from ground and aerial applications of herbicides.

4. Potential effects on TES terrestrial and aquatic species from ground and aerial applications of herbicides.

5. Potential effects on TES plant species from ground and aerial applications of herbicides.

6. Potential effects on human health from ground and aerial applications of herbicides.

   There also seems to be reasonable support from the public (13.6 percent of those who responded) for the need to address human-caused activities or uses that lead to or exacerbate weed expansion, encroachment, and establishment, namely, livestock grazing, logging, roads, mining, and recreation (OHVs). These concerns led to an additional issue:

7. Human uses exacerbate the spread and establishment of noxious and invasive non-native weeds. Without a proactive prevention strategy that limits, modifies, or curtails current human uses on the S-CNF, any type of physical treatment will not be successful in controlling weeds.

   This issue led to the development and consideration early in the project of an additional alternative—the Proactive Prevention Alternative. This alternative alters the original intent and scope of weed treatment activities and focuses taking action on numerous human use activities as a means to actively prevent the establishment and spread of weeds, while at the same time incorporating the full range of weed treatment activities.

Public, government, and Tribal distribution of the Draft EIS for review and comment began with a Notice of Availability published in the Federal Register on November 15, 2002. Additional notices were published in the Challis Messenger, the Arco Advertiser, and the Salmon Recorder-Herald during the week of November 10, 2002. The Draft EIS was sent to the members of the public and other individuals who attended public meetings and/or requested a copy of the Draft EIS. It was also made available on the S-CNF web site (www.fs.fed.gov/r4/sc). A hard copy and compact disc version of the Draft EIS were made available for public review at the Forest Service Office in Salmon, Idaho.

Three public meetings were held during December 2002 to receive comments on the Draft EIS:

- Arco, Idaho, on December 10, 2002, 6:00 p.m., at the "Business Incubation Center." Two individuals attended.
- Challis, Idaho, on December 11, 2002, 6:00 p.m., at the Forest Service Office on Highway 93. Two individuals attended.
- Salmon, Idaho, on December 12, 2002, 6:00 p.m., at the Forest Service Headquarters on Highway 93. Three individuals attended.

Notices of these meetings were published in local newspapers and on the S-CNF web site. Officials from the Forest Service were available to answer questions. Comment forms were available at each meeting. One individual filled out a comment form in support of the Proposed Action. No other comment forms were received at the public meetings.

All notices of availability of the Draft EIS announced a 60-day public comment period, which closed on January 14, 2003. Comments were received in the form of written letters (11), e-mail messages (2), and comment forms from public meetings (1, as described above). Comments received after the close of the comment period were also reviewed and responded to accordingly.

The Forest Service's NEPA handbook (40 CFR1503.4) gives direction on what to do with comments received on a Draft EIS. The Interdisciplinary (ID) Team is to review, analyze, evaluate, and respond to substantive comments on the Draft EIS. All comment letters were reviewed, in full, by the ID Team. The ID Team then analyzed each comment for content, and evaluated whether the statement/question was indeed a substantive comment or an opinion. Substantive comments and responses were divided into five general categories as identified in the FS 1905.15 handbook. They are listed in the following text and described in *Chapter 5, Consultation and Coordination.*

- Modify alternatives including the Proposed Action
- Develop and evaluate alternatives not previously given serious consideration by the agency
- Supplement, improve, or modify the analyses
- Make factual corrections
- Explain why the comments do not warrant further agency response

The first step in responding to public comments was to identify comments and assign comment numbers to the individual remarks in each piece of correspondence. A total of 272 individual comments were reviewed. Next, the ID Team wrote a response to each identified comment. Where commenters shared the same concern about an issue, the ID Team generally referenced the first comment and response where the concern was raised. The full text of the comments and responses is provided in Appendix M of this Final EIS.

This Final EIS was developed by incorporating and reviewing comments from the public and responses to those comments prepared by the ID Team. Some comments generated the text revisions that have been included in the body of this Final EIS. Responses to comments in Appendix M note where such text changes have been made, generally to provide additional information or to clarify discussions of project area resources and potential project effects. All issues raised during the official comment period were reviewed by the ID Team, which then generated the responses shown in Appendix M.

This Final EIS was distributed upon publication of a Notice of Availability in the Federal Register, additional notices published in local news outlets, and placement on the S-CNF web site. Notices were also mailed to commenters and others who requested information about the Final EIS. A hard copy and a compact disc of the Final EIS were also made available for public review at Forest Service Headquarters in Salmon, Idaho.

The Record of Decision (ROD) will describe the alternative selected for implementation and its potential project effects. When the ROD becomes available, a notice will be placed in the same news outlets previously used in this process for the Draft and Final EISs, and it will also be available on the S-CNF web site. The ROD will be distributed to all who request a copy.

TABLE ES-2
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Management Goals See Section 2.D.2.	• Maintain noxious weed prevention, education, and public awareness programs • Treat about 3,000 to 3,500 acres annually • Eradicate new invaders using approved herbicides and other treatment methods • Control and reduce spread of established weed infestations • Coordinate with counties and state agencies to determine priorities and develop uniform treatment strategies	The management objective is to maximize treatment of noxious weeds throughout the S-CNF as quickly as reasonably possible through a full array of treatment and non-treatment practices. The Proposed Action would treat about 18,000 acres of weeds each year and employ the following management goals: For all S-CNF Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100% • Reduce established infestations of aggressive weeds >25 acres in size by 50% • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	Essentially the same as the Proposed Action, except this alternative does not include the aerial application of herbicides and is, therefore, less aggressive. About 18,000 acres of weeds would be treated each year. Different, lowered expectations for this alternative require different goals, depending on the conditions in the Ranger Districts: For Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Reduce established infestations of aggressive weeds >25 acres in size by 25% • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	This alternative limits the kind of treatment methods available (no herbicides), and the success of these methods would be limited. About 18,000 acres of weeds would be treated each year. Different, lowered expectations for this alternative require different goals, depending on the conditions in the Ranger Districts: For Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Contain established infestations of aggressive weeds >25 acres • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Control infestations of less aggressive weeds >5 acres in size • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process

TABLE ES-2
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
			For the North Fork and Salmon-Cobalt Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Contain established infestations of aggressive weeds >25 acres in size • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	For the North Fork and Salmon-Cobalt Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Contain established infestations of aggressive weeds 5 to 25 acres • Contain established infestations of aggressive weeds >25 acres • Contain all new starts (<5 acres in size) of less aggressive weeds • Contain infestations of less aggressive weeds >5 acres in size • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process
Purpose and Need See Section 1.C. 1. Protect the natural condition and biodiversity of ecosystems and watershed function within the S-CNF by preventing and/or limiting introduction/spread of invasive non-native plant species.	Does not meet purpose and need. Would continue current noxious weed program. This alternative does not have the flexibility of the Proposed Action. The proportion of acreage treated with a particular chemical or method would vary from year to year, but would generally be limited to about 3,500 acres. Weeds in untreated areas would continue to spread.	Meets purpose and need. Uses full array of treatment and non-treatment methods to maximize the treatment of weeds as quickly as reasonably possible. Use of adaptive strategy, the minimum tool approach, and site-by-site implementation process would manage current and future weed populations. With aerial application and other cost-efficient methods available, the cost of treatment can be effectively spread throughout the S-CNF, based on the priorities identified.	Meets purpose and need, but less effectively than the Proposed Action. In the largest infested areas (typically steep and rocky), the most cost-effective mechanical and ground-spraying methods would not be available or limited. However, the need would be somewhat met through more expensive ground applications such as backpack and ATV applications where access and terrain are favorable. In the long term, the purpose and need would not be met or only very minimally met. Inaccessible large infestations could not be effectively treated due to limited mechanical treatment options and ground-based chemical applications.	Does not meet purpose and need. This alternative would not use herbicides; most mechanical methods would be ineffective on the larger infestations occupying the steep and rocky terrain of the North Fork and Salmon-Cobalt Ranger Districts. Choice of treatment methods would be severely limited and in most cases the effectiveness of the treatment would be questionable. Flexibility of treatment would be limited. In the long term, weeds would continue to spread.

TABLE ES-2
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
2. Eliminate new weed invaders before they become established.	Minimally meets purpose and need. Does not include adaptive weed management strategy or the full array of treatment options. S-CNF personnel would be limited in the timeliness and scope of response to new infestations. This is the top treatment priority. In order to meet this purpose and need, resources would be reallocated from other treatment priorities/projects.	Meets purpose and need. Includes full array of treatment and non-treatment methods; allows swift response and follow-up monitoring if new weed invaders become established.	Minimally meets purpose and need. However, without aerial spraying, the largest weed infestations may only be contained or reduced by 25%. This is the top treatment priority. In order to meet this purpose and need, resources would be reallocated from other treatment priorities/projects.	Minimally meets the purpose and need, since eradication of new invaders is the primary goal for all treatment methods. However, the limited availability of alternative treatments and the expected time frame for effective success could result in only control or containment of the new infestation, not eradication.
3. Contain and reduce known and potential weed seed sources throughout the S-CNF.	Does not meet purpose and need. The current level (acres) of treatment is considerably less than known weed infestations, thus having little overall impact on weed seed sources.	Meets purpose and need. Known weed infestations would be eradicated, controlled, or contained.	Meets purpose and need, but not as effectively as the Proposed Action. Most known and potential weed sources would be reduced or contained.	Does not meet purpose and need, particularly if new and existing weed populations must be eradicated first. Given the cost of methods available under this alternative, the entire annual funding would likely be taken by eradication priorities.
4. Prevent or limit the spread of established weeds into areas containing little or no infestation.	Does not meet purpose and need. The No Action Alternative does not include a Forest-wide action plan to reduce or contain known weed sources. S-CNF personnel would be constrained from responding in a timely and cost-efficient manner to new weed infestations.	Meets purpose and need. Currently weed-free areas would be maintained in that condition through monitoring, adaptive strategy, site-specific implementation, and minimum tool approaches.	Meets purpose and need, but not as effectively as the Proposed Action. Most known weed infestations would be monitored, and any spread could be eradicated by use of the available treatment and non-treatment practices.	Does not meet purpose and need. This alternative focuses on containing established infestations. However, in the long term, the available treatment options would be unable to contain weed infestations as the "contained" infestations would continue to grow.
5. Protect sensitive and unique habitats from new and existing weed infestations.	Does not meet purpose and need. The No Action Alternative does not prevent new or existing weed populations from spreading.	Meets purpose and need. This alternative uses non-treatment and a full array of treatment options to aggressively prevent the spread of new and existing weed populations.	Would meet purpose and need where terrain allows effective treatment options. In areas of steep and rocky terrain (also the areas with the largest infestations of aggressive weeds), this purpose and need would not be met in the long term. Weed invasion from inaccessible areas would prevail and probably spread into more sensitive areas.	Does not meet purpose and need. Aggressive noxious weeds would spread throughout sensitive areas that are already at high risk for infestation.

TABLE ES-2

Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
6. Develop criteria to prioritize invasive weed species and treatment areas.	Does not meet purpose and need. Prioritizes treatment methods and acres treated according to species of weed, its aggressiveness, whether it is new or established, and the location and size of the infestation. However, a full range of options to implement priorities is not available.	Meets purpose and need. Identifies treatment based on species of weeds present, their degree of aggressiveness, and the sizes and numbers of infestations; corresponding treatment priorities and objectives; treatment methods available; and estimated annual acres for treatment (18,000).	Meets purpose and need, but not as effectively as the Proposed Action. The largest areas of infestations may be treated with less aggressive measures since the typically steep and rocky terrain cannot be treated effectively with the available options. Although species and treatment areas would be identified and prioritized, the infestation may go unchecked while available options are implemented.	Does not meet purpose and need. Although management goals and priorities have been assigned under this alternative, these goals have greatly reduced "control and reduce" goals while increasing "contain" goals. Thus, prioritization and effectiveness are substantially reduced. Costs of eradication (the first priority in all alternatives) would also limit the ability to meet other control priorities.
7. Comply with and implement current Federal and State law regarding the control of noxious and other invasive, non-native weed species.	Does not meet purpose and need. Under this alternative, weed populations would not be contained or eradicated as required by law.	Meets purpose and need.	Meets purpose and need.	Minimally meets purpose and need, but containment is the only realistic goal in many locations under this alternative.
8. Cooperate with county, state, and other Federal agencies, private landowners, and other organizations interested in managing invasive weeds.	Minimally meets purpose and need.	Meets purpose and need. Would provide the most comprehensive weed treatment and communication with non-U.S. Forest Service organizations.	Meets purpose and need using the same methods as the Proposed Action.	Minimally meets purpose and need. The obligations of the S-CNF in cooperative efforts of weed control would be greatly reduced under this alternative.
Treatment Practices See Section 2.C.1.	No action implies no change from current weed management practices. Generally limited by selection of chemicals and mechanical methods, and the realm of treatment and non-treatment methods is limited to existing strategies. Total acres to be treated annually: up to about 3,500.	Most aggressive application of full array of treatment and non-treatment methods, including aerial application of herbicide. Total acres to be treated annually: about 18,000.	Employs full array of treatment and non-treatment methods, except aerial application of herbicide. Total acres to be treated annually: about 18,000.	Employs full array of treatment and non-treatment methods, except herbicide application. Total acres to be treated annually: about 18,000.
Site Restoration and Monitoring See Section 2.C.3.	Limited in scope. Monitor program implementation and measure the effectiveness of treatments on target species.	Implement (where appropriate) site restoration, re-vegetation, and implementation and effectiveness monitoring following treatment to reduce or eliminate the subsequent reinvasion of weeds, measure the degree of treatment success, and validate buffering effectiveness.	Same as the Proposed Action.	Similar to the Proposed Action (excluding buffer validation monitoring).

TABLE ES-2
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Adaptive Strategy See Section 2.C.4.	Not included. Constrains S-CNF managers from responding in a timely and cost-effective manner to new weed infestations and expansion of existing weed infestations.	Implements S-CNF-wide action plan to reduce or eliminate spread of weeds; adaptive weed management strategy for managing future new weed infestations or expansion of existing infestations.	Same as the Proposed Action	Same as the Proposed Action
Minimum Tool Approach and Site-Specific Implementation Process See Sections 2.C.5 and 2.C.6.	Not included	Employ site-specific minimum tool approach for effectively managing future weed infestations with the least impact on S-CNF resources, uses, and values.	Same as Proposed Action.	Same as Proposed Action.
Total Cost per Year See Table 2-8 for detail.	$843,226	$3,017,588	$6,852,750	$16,370,000
Cost Per Acre per Year See Table 2-8 for detail.	$241	$168	$381	$909
Cost vs. Benefit Cost per acre: **Low**: $<200 **Moderate**: $201-300 **High**: >$300 See Table 2-8 for detailed supporting information and assumptions regarding costs per acre for different treatment methods for the Proposed Action and alternatives. Benefit is the overall effectiveness in light of the purpose and need compared to other alternatives:	Total annual cost is considered moderate, since treatment options are limited and the number of acres to be treated is much less than the other alternatives. Average cost per acre for all acres treated is moderate. See Table 2-8 for details on costs. Benefit is considered low. Overall weed treatment effectiveness of the No Action Alternative would be lower than for the Proposed Action or Alternative 1 because of fewer treatment options and fewer acres treated each year, but greater than for Alternative 2 because of more treatment options. See Table 4-8 for details on benefits.	Total annual cost is considered low, depending on treatment combinations and acres treated. Average cost per acre for all acres treated is low. See Table 2-8 for details on costs. Benefit is considered high. Provides the greatest number of weed treatment options and ability to reach large acreages and difficult access areas. Overall weed treatment effectiveness of the Proposed Action would be greater than for Alternatives 1 and 2 and the No Action Alternative because of a full range of treatment options and the number of acres to be treated each year. See Table 4-8 for details on benefits.	Total annual cost is considered high, depending on treatment combinations and acres treated. Average cost per acre for all acres treated is high. Weed treatment options limited by lack of aerial herbicide application. See Table 2-8 for details on costs. Benefit is considered moderate/high. Overall weed treatment effectiveness of Alternative 1 would be less than for the Proposed Action because of fewer treatment options, but greater than for Alternative 2 and the No Action Alternative because of more treatment options and/ or more acres treated each year. See Table 4-8 for details on benefits.	Total annual cost is considered high. Average cost per acre for all acres treated is high. Weed treatment options are limited to mechanical, biological, and grazing methods. Grazing may not be an option for many areas, and some mechanical treatments may be limited in application. See Table 2-8 for details on costs. Benefit is considered low. Overall weed treatment effectiveness of Alternative 2 would be less than for the Proposed Action, Alternative 1, and the No Action Alternative because of fewer effective weed treatment options. See Table 4-8 for details on benefits.

TABLE ES-2
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Low: Does not meet purpose and need. **Moderate**: Meets purpose and need, but not effectively. **High**: Meets purpose and need effectively. See Table 4-8 for a summary of project-related effects and benefits for the Proposed Action and alternatives.				
Cost Effectiveness See Section 4.D.4	Cost effectiveness is considered low to moderate because fewer acres would be treated under this alternative and weed treatment goals would not be met.	Cost effectiveness is considered high because treatment methods could be selected to most efficiently and effectively meet all weed treatment goals.	Cost effectiveness is considered low to moderate because of limited use of the most economic and effective treatment methods and not meeting all weed treatment goals.	Cost effectiveness is considered low because of the use of expensive weed treatment methods with limited effectiveness and not meeting weed treatment goals.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Biological Resources				
Vegetation Resources and Noxious Weeds	Noxious weeds negatively impact the natural plant communities they invade by reducing plant diversity and species richness, by decreasing the quality of habitat values for wildlife, and by overwhelming sensitive plant populations. Noxious weeds would continue to displace native vegetation at the same or higher rates than currently.	Would use a blend of weed treatment methods and site restoration, designed to aggressively eradicate, control, and contain weeds and to restore areas (where appropriate) following treatment. Expected beneficial effects are: 1) improve and increase the biodiversity of native vegetation, 2) improve quality habitat for wildlife, and 3) protect the integrity of ecological sites for sensitive plant species. Aerial treatment is used to control and eradicate very large infestations in isolated areas with steep slopes and rocky soils.	Benefits described for the Proposed Action could still be achieved, but it would take much longer. The further spread of noxious weeds would be controlled, but little would be done to eradicate large infestations currently in place. There would need to be constant efforts to control the spread of weeds from current sites.	Alternative 2 may, with a large, constant labor outlay, control the further spread of noxious weeds. The reduction in size or elimination of current weed sites would likely not occur and it would take much longer than the Proposed Action, Alternative 1, or the No Action Alternative to see any positive results. No herbicide use would mean there is no possibility of inadvertently impacting native vegetation, wildlife habitat, or sensitive plants from chemical drift.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Aquatic Resources	Increased potential for soil erosion and stream sedimentation at weed-infested sites would continue. This can adversely affect aquatic habitat and associated fish and aquatic invertebrate populations.	Treating and reclaiming weed-infested areas would result in improved aquatic and riparian habitat conditions and reduced threats to all aquatic species. Four worst-case situations involving the use of herbicides include the inadvertent entry of herbicides into aquatic ecosystems through surface runoff, leaching through soils, accidental spills, and wind drift. BMPs and mitigation measures would avoid or minimize these effects.	Similar to the Proposed Action, except that no aerial application of herbicides would take place, making it a less aggressive weed treatment alternative than the Proposed Action. This decreases the chance for wind drift into aquatic systems during application, but increases the time before weeds are eradicated, contained, or controlled and habitat is restored.	Benefits to aquatic resources under Alternative 2 would be less than those for the Proposed Action, Alternative 1, or the No Action Alternative. It would take longer to realize some limited benefits to aquatic and riparian resources resulting from reduced erosion and sediment delivery at successfully treated weed-infested sites to drainages. The increased use of mechanical treatments would result in increased surface disturbance potentially increasing sediment delivery to streams. There would be no potential for any of the worst-case situations involving herbicide application.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Wildlife Resources	All wildlife species would be affected to varying degrees from weed expansion. As weeds expand they displace native plant communities; reduce hiding cover, which may cause smaller wildlife species to abandon an area, in turn displacing predators; and reduce forage on big game winter range. Long-term threats to wildlife would be moderate to high.	Minimal impacts from weed control activities are expected to any wildlife species. Short-term disturbance and displacement is expected during treatment applications; usually less than 1 day. Long-term benefits to all wildlife species would be high as native plant communities are restored following weed treatment.	Long-term benefits to wildlife would be moderate and less than the Proposed Action, and would occur at a slower rate because of no aerial application of herbicides under Alternative 1.	Long-term threats to wildlife would generally be high. Infestations would continue to expand, since this alternative incorporates relatively non-aggressive treatment technologies. The result would be a reduction in available forage for wildlife. Additionally, it would take a longer period of time to achieve the same or lesser levels of weed control than could be achieved using herbicides; rapidly expanding infestations would likely continue to increase in size. Therefore, it would take longer to realize any benefits to wildlife from the control and eradication of weeds.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Ecosystem Function	Ecosystem function would experience little to no impact from treatment of noxious weeds, but ecosystem function would be adversely affected by continued weed population expansion.	Impacts would be less under the Proposed Action than the No Action Alternative. Weeds would be aggressively eradicated, controlled, or contained using a variety of methods, and treatment sites would be restored to native vegetation. Loss of native plant communities would decrease over time as weeds are reduced and eliminated. Long-term eradication in steep and rocky terrain would be most effective with aerial application.	Effects on ecosystem function would generally be similar to those described for the Proposed Action, but would occur at a slower pace because of no aerial herbicide application under Alternative 1. Treatment success and improvements to ecosystem function on infested steep slopes or inaccessible areas would not be as effective or as widespread as under the Proposed Action. Earlier efforts on this terrain have only been marginally successful. There would be negative effects on these areas (e.g., infestations would increase) because these methods alone cannot be effectively used on this terrain.	Direct and indirect adverse effects on ecosystem function would be greater than those described for the Proposed Action, Alternative 1, and the No Action Alternative. The timeframe for implementation and any visible treatment success would be longer, but there would be no risk from herbicide application. Indirect adverse effects would include continued expansion of infestations, especially in steep and rocky terrain where mechanical methods cannot be used.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Physical Resources				
Surface Water	Although increased runoff from weed-infested sites may result in local, short-term variations in a stream's hydrograph, this would not be expected to alter a drainage's seasonal flow regime. The existing use of herbicides would continue at the current rate, limited monitoring indicates these activities have not impacted surface water quality, hydrology, 303(d)-designated water bodies, or designated beneficial uses.	Effects of weed treatment under the Proposed Action would be expected to result in some improvement in surface water quality. Potential short-term impacts on surface water quality could occur if there were an accidental spill of a relatively toxic herbicide in a small drainage. Adherence to BMPs and mitigation measures would reduce the likelihood of such a spill occurring. Aerial applications also would help minimize the threat of spills at or near treatment areas.	Effects on surface water would generally be similar to those effects described for the Proposed Action, except there would be no aerial application of herbicides. Benefits to surface water quality resulting from reductions in erosion and sediment delivery from weed-infested areas would still be expected, but they would take longer to achieve and be less widespread than under the Proposed Action.	The magnitude of direct and indirect benefits to surface water quality would be expected to be less than those for the Proposed Action, Alternative 1, or the No Action Alternative. It also would take longer to realize any benefits to surface water quality resulting from reduced erosion and sediment delivery at weed-infested sites to drainages.
Groundwater	The No Action Alternative would not affect groundwater resources or drinking water quality.	If the worst-case situation involving leaching of herbicides that was discussed did occur, it would have a very minor or negligible effect on groundwater quality and would not be expected to result in violations of drinking water standards.	The potential effect of Alternative 1 on groundwater resources would be the same as described for the Proposed Action.	Alternative 2 would not affect groundwater resources or drinking water quality.
Soils, Geology, and Minerals	Soils, geology, and minerals would experience little to no impact from treatment of noxious weeds, but soil stability and productivity would be affected by weed population expansion.	Declines in soil productivity would diminish with the Proposed Action as native plant communities become established on eradicated weed sites and restore the nutrient and organic matter balance over time.	There would be long-term benefits to soils from the reduction in size of weed populations and subsequent reduction in erosion. Similar to the Proposed Action, Alternative 1 would not affect geology and minerals.	It would take longer to realize any benefits to soils from the control and eradication of weeds. Alternative 2 would not affect geology and minerals. Eradication or control of larger infestations would not occur, thus leaving soils in jeopardy of continued degradation.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Land Uses and Designations	Invasive weeds would continue to affect commercial and recreational values on the S-CNF—and in the communities that rely on a healthy forest ecosystem. There would be a high threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	Commercial and recreational activities may be affected as access to infested areas is restricted during spraying and other weed treatments. However, the Proposed Action would eradicate some weed populations, and would effectively reduce the size and rate of spread of other infestations, which ultimately benefits land use. There would be a low threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	Because this alternative would not incorporate aerial spraying activities, large weed infestations on steep, inaccessible slopes of the S-CNF would be more difficult to control. This could lead to expansion of infestations and some additional loss of wildland acres. This would also affect recreational and commercial uses, since weed control activities would take longer and be less effective in that area. There would be a moderate threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	While this alternative offers a full array of non-chemical weed treatment methods, it is anticipated that treatment would take longer and be less effective than the Proposed Action, Alternative 1, or the No Action Alternative. Commercial and recreational opportunities would be affected, since weed infestations would remain, and likely expand, as non-chemical treatments are implemented. There would be a high threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.
Visual Resources	Noxious weed populations primarily affect views of the immediate foreground and middle ground, rather than the background, except where plant infestations are large enough to impact views of hillsides. The opportunity to view native vegetation and wildlife would be reduced.	Visual quality in treated areas would improve. During treatment, however, visual opportunities may be temporarily diminished as weed populations die and natural vegetation is restored and recovers. This effect is expected to be short-lived, and would be most apparent where there are large weed infestations.	The visual impact would be most apparent where large infestations of weeds occur on steep slopes. Ground application of herbicides may have some long-term effects on weed infestations, but control and eradication goals may not be met, with a corresponding effect on visual opportunities. As a result, the vistas of these steep, often inaccessible slopes would be marred by weeds indefinitely.	Some loss of additional opportunities for viewing the natural landscape would occur as non-chemical treatments take time to implement. Other large weed infestations could also expand, since most weed types do not immediately respond to non-chemical treatment. Continued, permanent loss of opportunities may occur as weed infestations begin to spread beyond the capacity to manage expansion and new growth.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Air Quality and Noise	The only effects on air quality would be potential drift from herbicide spraying and some dust from mechanical treatment. Spot spraying would result in little drift. The odor of the chemicals may persist for several hours. Other effects on air quality would include dust from weed control efforts. The only short-term effect on noise levels would be from localized mechanical treatments such as mowing and mulching.	Weed treatments would have the same impacts as described for the No Action Alternative. Since the Proposed Action would provide for the greatest level of weed control, it would contribute the greatest reduction in the amount of airborne weed pollen present in the affected area. The short-term effects on noise levels would stem from aerial herbicide application and mechanical operations.	The direct effects on air quality of Alternative 1 would be virtually identical to those of the Proposed Action, although the short-term risk of drift from aerial spraying would be removed. Overhead noise from aerial herbicide applications would not occur, thus decreasing the impact on noise levels from weed treatments.	Short-term effects on air quality from herbicides would not occur. Beneficial effects of reduced weed pollen on any particular site would occur if weeds are reduced on that site. Individually, these effects may be too small to benefit local air quality. Extensive mechanical weed treatments may cause short-term effects on dust and noise levels within the areas of treatment.
Human and Socioeconomic Resources				
Human Health and Safety	Noxious weeds do not pose a human health and safety risk, except from minor cuts and scrapes and skin irritation from contact with weeds, and allergies from weed pollen. Current ground-based herbicide spraying has not impacted public health and safety and is not expected to cause an impact.	Workers are at risk from cuts, scratches, and skin irritation, and sprains and strains from working on uneven ground. Toxicity studies indicated that worker risks from herbicides would be extremely low. Safety protocols would minimize or eliminate this risk. Risks to the public while collecting wild edible vegetation are virtually non-existent.	Effects would be similar to the Proposed Action, except that the risk of herbicide drift would be reduced because aerial spraying would not be used. Treating steep, inaccessible areas with ground-based treatments increases the risk of worker injury.	Risks from herbicide application would be completely eliminated. However, workers would still be subject to potential sprains, strains, cuts, scratches, and skin irritation from contact with weeds. Increased mechanical treatments increase the risk of injury substantially, especially on steep slopes.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Indian Trust Assets/Treaty Rights	The spread of weeds would likely continue to displace and adversely affect native vegetation gathered by local Tribes. The traditional use of these plants would be further affected as access is affected by continued weed control efforts. Other Trust Assets that could also be directly affected are resident and anadromous fisheries and their habitat, which may experience degradation from increased sediment delivery to streams from weed infestations.	Biological and physical resources would benefit overall, as described above. However, there may be short-term adverse effects from herbicide odor and drift to non-target areas during aerial spraying. Other adverse, short-term effects may stem from chemical odors and drift as ground-based herbicides are applied and from disturbance of resources during mechanical treatment. The cultural gathering of plants may be affected, but only for a short time during treatment. Direct adverse impacts to terrestrial and aquatic habitats and species are expected to be none or minimal. With reduced weed infestations, long-term indirect beneficial effects to these habitats are expected, benefiting Tribal Treaty Rights.	This alternative would be identical to the Proposed Action, except no aerial herbicide application would occur. The experience of Native Americans using Trust Assets may be affected if the users know that weed control treatments are occurring nearby, or if access to these assets is restricted during and perhaps briefly following treatment. Long-term access to Trust Assets could be affected as weed eradication would take longer to perform under this alternative. Long-term beneficial effects to terrestrial and aquatic habitats would be less than the Proposed Action due to less effective treatment options, potentially affecting long-term Trust Assets and Treaty Rights.	This alternative would not incorporate herbicide applications, thus eliminating any potential risks of drift or chemical odor. However, this alternative may have a direct effect on weed control and expansion since the range of treatments would be limited, resulting in limited success and benefits compared to the Proposed Action, Alternative 1, and the No Action Alternative. Native American long-term access to Trust Assets would be affected by continued weed expansion expected under this alternative. In addition, with the continued weed expansion, long-term effects to terrestrial and aquatic habitats would likely be significant, adversely affecting Trust Assets and Treaty Rights.
Environmental Justice	The No Action Alternative would not alter subsistence rights and fishing by Native American Tribes, and would not disproportionately impact minority and low-income populations.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Economics	Adjacent communities would share the economic impact of losses from weed infestations since these communities rely on the forest resources for their livelihood. Effects on vegetation, fisheries, wildlife, and ecosystem function would also influence the economic well-being of these adjacent communities. The land itself has value, the loss of which represents an important economic impact. A conservative estimate of the wildland acreage is approximately $3.95 per acre, with rangeland values at $10.73 per acre. The estimated cost of treating 3,500 acres annually under this alternative is approximately $843,000 ($241 per acre).	Given the economic cost of the No Action Alternative, a direct effect would be in savings of wildland and rangeland acres. A conservative estimate would include the savings of currently infested wildland acreage of approximately $3.95 per acre, with rangeland values of $10.73 per acre. The estimated cost of treating 18,000 acres annually under this alternative is approximately $3,020,000 ($168 per acre).	The economic effects stemming from the cost of this alternative would be essentially the same as the Proposed Action, except the cost of aerial herbicide application would not be included. There would be less acreage affected by wildland and rangeland acreage savings (approximately $3.95 per acre and $10.73 per acre, respectively) with this alternative since treatment in steep, rough terrain would be difficult. The estimated cost of treating 18,000 acres annually under this alternative is approximately $6,850,000 ($381 per acre).	Alternative 2 would consist of non-chemical weed treatment methods. These techniques take time and can be labor intensive, thus increasing the potential long-term costs of this alternative. Wildland and rangeland acreage savings (approximately $3.95 per acre and $10.73 per acre, respectively) would not be realized as non-chemical eradication efforts may not keep pace with infestations. The estimated cost of treating 18,000 acres annually under this alternative is approximately $16,370,000 ($909 per acre)

TABLE ES-3
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Cultural Resources				
Cultural and Historical Resources and Native American Religious Concerns	The spread of weeds would likely continue to displace native vegetation gathered by local Tribes. The traditional use of these plants would be affected as access is affected by continued weed control efforts. The continued presence of noxious weeds along the Lewis and Clark Trail could result in a reduction of the historical integrity of trail and camping sites.	Offers the greatest recovery potential for currently infested historic landscapes while having a minimal effect on cultural and historic values. Access to important cultural sites may be temporarily restricted during weed treatment efforts. Native American users' experiences in culturally important or sacred sites may be affected as the users become aware of ongoing treatment activities.	Similar to the Proposed Action.	Similar to Alternative 1. However, large weed infestations may take longer to treat under this method, since the aerial application of herbicide has been shown to be the quickest method of weed treatment. The potential for disturbing cultural resources would be greatest under this alternative because of the planned extensive use of mechanical treatments.
Paleontological Resources	No effects are anticipated from the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.

Chapter 1. Purpose and Need

1.A. Introduction

This Final Environmental Impact Statement (Final EIS) was prepared pursuant to requirements of the National Environmental Policy Act (NEPA) for the Salmon-Challis National Forest (S-CNF) Noxious Weed Management Program. The S-CNF proposes to implement an integrated series of weed treatment practices that would eradicate, reduce, and/or slow the spread of noxious and invasive non-native populations of weeds on the S-CNF. The project area covers more than three million acres of the S-CNF, excluding the Frank Church River of No Return Wilderness (FCRONRW), and includes existing as well as future potential weed infestation sites. Map 1-1 (back of Chapter 1) shows the boundaries of the S-CNF and its location in Idaho.

This chapter of the Final EIS describes the problems caused by noxious weeds, explains the purpose and need to control the spread of weeds on the S-CNF, and summarizes the Proposed Action. This chapter also describes the management direction for the S-CNF, interrelated projects, scope of the analysis in this Final EIS, and decisions to ultimately be made.

1.A.1., Integrated Weed Management

As part of a larger integrated pest management (IPM) strategy (as defined in Forest Service Handbook 3409), the S-CNF uses the integrated weed management (IWM) approach to manage noxious and invasive non-native weeds. The IWM approach is an important component of the purpose and need described in this chapter. Through IWM, the S-CNF recognizes that a single management approach will not be successful, but that implementing a fully integrated approach to weed management significantly improves the chances of meeting the management goals of this Final EIS.

The Forest Service (1995a) Manual on Noxious Weed Management (FSM 2080.5) states that IWM is, "An interdisciplinary pest management approach for selecting methods for preventing, containing, and controlling noxious weeds in coordination with other resource management activities to achieve optimum management goals and objectives." IWM goals for the S-CNF are reflected in the eight project purposes described in this Chapter. These goals include eradicating, controlling, containing, and preventing the occurrence of noxious and invasive non-native weeds on the Forest to protect the natural condition and biodiversity of ecosystems, as well as sensitive and unique habitats and associated biota, and to maintain or improve watershed health and function. Management goals also include informing and educating the public on weed problems; working cooperatively with state, county, and local agencies and private landowners to increase the effectiveness of weed management efforts; and complying with applicable laws, orders, policies, strategies, and Forest Plans pertaining to weed control.

Important non-treatment practices are the cornerstone of IWM and will continue as an integral component of IWM in all alternatives and the Proposed Action addressed in this Final EIS. They are:

Weed Prevention. Proactive weed prevention is the first priority in the management of noxious weeds. "Weed prevention" consists of proactive measures that reduce or prevent the likelihood of introducing, establishing, and spreading noxious weeds. This practice is an essential consideration in Forest-wide administrative actions such as implementing and enforcing travel plans and the administration of livestock grazing through allotment management plans and annual use permits. Ongoing and proposed S-CNF activities also incorporate project mitigation measures, standard operating procedures, and best management practices (BMPs) that address weed prevention measures pertinent to each project. This program is a critical, and cost-efficient, component of IWM.

Weed Inventory and Early Detection. This practice consists of regularly gathering data on the extent, location, and composition of weed species on the S-CNF for use in refining weed management objectives, determining treatment priorities, and selecting the most effective treatment methods for use.

Information and Education Programs. These programs target both external and internal audiences. External programs are designed to inform and educate the public regarding weed problems on and immediately adjacent to the S-CNF, the effects of weeds on other forest resources, available treatment, and how humans can affect the spread of weeds. Internal programs include S-CNF staff training and monitoring programs. Education includes consultation, brochures, and posters.

Cooperative Partnerships and Coordination. This practice consists of developing cooperative partnerships with groups dedicated to weed management on and adjacent to the S-CNF.

Legal Compliance. The S-CNF will comply with and implement current federal and state laws, Presidential Executive Orders, Forest Policies and Strategies, and Forest Plans related to the management of noxious and other invasive, non-native weeds.

1.A.2. Cooperative Weed Management Areas and Other Coordinated Efforts

Cooperative Weed Management Areas (CWMAs) are a vital component of the Proposed Action and all alternatives presented in this Final EIS. The state of Idaho formed CWMAs as the centerpiece of its *Strategic Plan for Managing Noxious Weeds* in 1999 (Idaho Department of Agriculture 1999). Top priorities include the involvement of all landowners in a watershed or region, development of IWM Plans, and defining roles and partnerships that allow for the blurring of jurisdictional lines of ownership to optimize cooperative efforts. Each CWMA works with state, federal, and county officials, and neighboring CWMAs to coordinate weed management efforts. Coordination with CWMAs is an effective and successful approach to manage and treat noxious weeds within the S-CNF, prevent the spread of noxious weeds between the S-CNF and non-Forest lands, and educate the public.

The S-CNF coordinates weed management efforts with several CWMAs: Lemhi County CWMA, Custer County CWMA, the Lost Rivers (Butte and Custer Counties) CWMA,

and the Continental Divide CWMA (including parts of Lemhi, Butte, Jefferson, and Clark Counties). An additional CWMA for the FCRONRW is being finalized, which will expand coverage in Custer and Lemhi Counties and also include portions of Idaho and Valley Counties. These projects develop weed control activities with the BLM, S-CNF, and private landowners in each management area. The S-CNF participates actively in each of these CWMAs by providing workshops, personnel, funds, and equipment for weed control activities off S-CNF lands.

The S-CNF also develops cooperative partnerships with other groups dedicated to the coordinated and effective management of noxious weeds on and adjacent to the S-CNF. Presently, S-CNF managers work with Lemhi, Butte, and Custer Counties' community based weed management organizations, the Idaho Noxious Weed Coordinating Committee (INWCC), and other federal agencies to coordinate planning and control efforts. This coordination effort, along with continued participation in CWMAs, is an important part of future weed management activities for the S-CNF.

1.B. Noxious Weeds Defined

The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States, or the public health" (P.L. 93-629). Recent amendments categorize noxious weeds with "undesirable plants," defined as "plant species that are classified as undesirable, noxious, harmful, exotic, injurious, or poisonous, pursuant to State or Federal law." (7 USCA § 2814).

Idaho's Noxious Weed Control Act defines a noxious weed as "any plant having the potential to cause injury to public health, crops, livestock, land or other property; and which is designated as noxious ...." (Idaho Code § 22-2402).

Forest Service Manual 2080 defines noxious weeds as "those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host to serious insects or disease and being non-native or new to or not common to the United States or parts thereof." (U.S. Forest Service 1995a).

A weed is simply a plant out of place. A plant is usually considered a weed when it interferes with beneficial uses of land or water, displaces desirable or native plants, or affects human and animal health. Weeds aggressively compete for moisture, nutrients, space, and sunlight with surrounding desirable plants. Noxious weeds are non-native species with the potential to spread rapidly, usually through superior reproductive capacity, competitive advantage mechanisms, and lack of natural enemies. They are difficult to eradicate once established. In addition, large populations can lead to economic loss and declines in land values, grazing, and forage.

More than 40 weed species are considered in this analysis, including species designated as "noxious" by the State of Idaho and additional invasive species found on or near the

S-CNF. Weed species that occur on the S-CNF are referred to as established or new invaders, while those that occur near the S-CNF are referred to as potential invaders.

Generally, weeds are defined in terms of interference with the economic value of the land. The establishment and spread of noxious weeds often may signal the ecological decline of entire watersheds because of the detrimental impact of their spread on the biodiversity of plant communities. Declines in vegetative biodiversity are usually quickly followed by declines in faunal biodiversity in a domino effect. Noxious weeds are able to displace native vegetation by out-competing it (Callihan et al. 1999). Implementing weed management strategies early while infestations are manageable reduces the economic, cultural, and environmental impact these populations can have on the ecosystem.

1.C. Purpose and Need for Action

1.C.1. History

Before the arrival of Europeans, plant communities within what is now the S-CNF were represented by species that adapted to regional/local physical and biological forces over long periods. This vegetation provided habitat for fauna, soil stability, and watershed quality.

Plants foreign to the North American continent began arriving with the first Europeans. Exotic species have been spreading across the Pacific Northwest since the late 1800s, and records indicate that their densities are increasing and their range is expanding (Rice 2001). Recreation and commercial uses of the S-CNF have facilitated the spread of introduced species throughout the S-CNF. Many introduced species of plants occur on the S-CNF, including orchard grass, Kentucky bluegrass, timothy, and fruit trees. Generally, these species have become established in localized areas, but their ecological effects are not severe. Aggressive invasive species like spotted knapweed are capable of totally out-competing native species and can change ecosystem conditions, processes, and watershed function. These species can dominate the native plant community, altering the natural succession of vegetation and changing the way vegetation withstands and responds to natural disturbances like fire.

Noxious weed control on the S-CNF has been a continuing program generally directed at reducing identified infestations and arresting the spread of noxious weeds. In an Environmental Assessment (EA), Finding of No Significant Impact (FONSI), and Decision Notice prepared for noxious weed and poisonous plant control on the Challis National Forest in 1989, the Forest Service proposed to treat noxious weeds and poisonous plants. The EA reported that the "weeds are found as single plants or in small patches 0.01 acre or in large areas of up to 20 acres and are widely scattered over the entire National Forest." Target weed species listed in the Challis National Forest EA included spotted knapweed, Canada and musk thistle, leafy spurge, black henbane, and toadflax, as well as larkspur, a native poisonous plant. The Forest Service (1989) reported that the noxious weed project acres covered within the Challis National Forest EA totaled 30,020 acres.

In similar documents prepared for the Salmon National Forest in 1987, the Forest Service proposed treatments of noxious weeds and poisonous plants. Noxious weed project acres covered in the Salmon National Forest EA totaled 1,695 acres with six weed species targeted for treatment. They consisted of yellow toadflax, leafy spurge, spotted knapweed, Canada and musk thistle, and black henbane. In 1987, spotted knapweed was estimated to cover a project area of approximately 1,000 acres in five drainages on the North Fork Ranger District, with approximately 120 acres targeted for treatment using biological controls. On the Salmon and Cobalt Ranger Districts in 1987, spotted knapweed covered a project area of approximately 100 acres in two drainages, with about 10 acres targeted for treatment using herbicides. Today, spotted knapweed occupies approximately 54,568 acres at approximately 500 sites on the North Fork Ranger District and 7,539 acres at more than 500 sites on the Salmon-Cobalt Ranger District. Spotted knapweed also is present, but much less abundant, on all of the other S-CNF Ranger Districts. Figure 1-1 depicts several of the noxious weed species that continue to be abundant on the S-CNF today.

1.C.2. Previous Weed Management Efforts

The Challis National Forest and the Salmon National Forest both adopted a weed control plan based on IPM in 1989 and 1987, respectively. These weed control efforts focused on the noxious and invasive species listed previously, including spotted knapweed, leafy spurge, Canada thistle, musk thistle, black henbane, and yellow toadflax. Weed treatments were very limited prior to 1995, but since then have generally increased each year from 586 acres treated in 1995 to 3,371 acres treated in 2001. Much of the early work was done in the North Fork Ranger District. Virtually all of these acreages were treated using herbicides; however, biocontrol efforts were initiated in the late 1980s in the North Fork Ranger District. The S-CNF has also worked with the State of Idaho, county weed control agencies, extension agents, and landowners to expand collaborative treatment efforts along roads and trails.

Early monitoring efforts focused on implementation monitoring of the proper application of mitigation measures and BMPs. Effectiveness monitoring of treatment success was generally limited to qualitative assessments of weed densities pre- and post-treatment. Although not formally evaluated, observations indicated the target species had been reduced in density and, in many locations, had either been eradicated or reduced in size. With the increased treatment efforts resulting from the wildfires of 2000, more quantitative monitoring efforts have been established. This monitoring entails establishing permanent transects and measuring the cover of target and non-target plant species. Transects were initiated in 2001 and are scheduled to be re-read in 2003.

Although weed treatment efforts have had some success, new weed infestations continue to appear on the S-CNF. Existing weed populations are expanding. The analysis contained in this Final EIS shows that nine weed species with established populations and 15 weed species with new populations presently occur on the S-CNF. Documented, measured infestations of these species on the S-CNF now exceed 66,000 acres at more than 2,500 sites. Most weed infestations range from less than 1 acre up to 25 acres in size, although extensive infestations of spotted knapweed are present on the northern part of the S-CNF. An additional 23 weed species of potential invaders

occur near the S-CNF. Table 1-1 lists the common and scientific names of the 23 potential, 15 new, and nine established weed species that presently occur on or near the S-CNF.

1.C.3. Project Purpose

The purposes of the proposed S-CNF Noxious Weed Management Program are to:

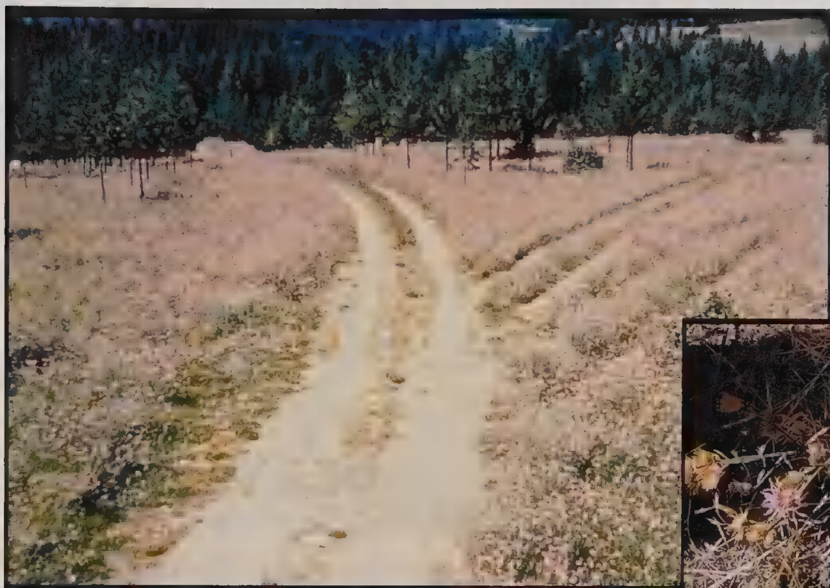
1. Protect the natural condition and biodiversity of ecosystems and watershed function within the S-CNF by preventing and/or limiting the introduction and subsequent spread of invasive, non-native plant species that displace native vegetation.
2. Eliminate new invaders (weed species not previously reported in an area) before they become established.
3. Contain and reduce known and potential weed seed sources throughout the S-CNF.
4. Prevent or limit the spread of established weeds into areas containing little or no infestation.
5. Protect sensitive and unique habitats including Research Natural Areas (RNAs), wetlands, riparian areas, and plant populations.
6. Develop criteria to prioritize invasive weed species and treatment areas. Use these criteria to identify priority weed treatment locations within the S-CNF.
7. Comply with and implement current Federal and State law, Presidential Executive Orders, Forest Service policy and strategies, and Forest Service plans regarding the control of noxious and other invasive, non-native weeds.
8. Cooperate with county, state, other federal agencies, and private land owners, and other organizations (including CWMAs) interested in managing invasive weeds.

The Notice of Intent (NOI) to prepare the Draft of this EIS stated that prioritization would be given to treating areas that may contribute to the continuing spread of weeds into Lemhi, Custer, and Butte Counties within the S-CNF.

1.C.4. Project Need

According to the recent scientific assessment of the Interior Columbia Basin, invading weeds can alter ecosystem processes, including productivity, decomposition, hydrology, nutrient cycling, and natural disturbance patterns such as frequency and intensity of wild fires (Quigley and Arbelbide 1997). Changing these processes can lead to displacement of native plant species, eventually impacting wildlife and native plant habitat, recreational opportunities, natural hydrologic processes, and scenic beauty.

Noxious and invasive, non-native weeds are spreading on public and private lands at an alarming rate. The Departments of Agriculture in 11 western states estimate that there are about 70,000,000 acres of invasive weeds on private, state, and federal wildlands (Asher and Spurrier 1998). At an average annual rate of spread of 14 percent (U.S. Bureau of Land Management 1985), the 70,000,000 acres of weed infestations would lead



Spotted Knapweed *(Centaurea maculosa)*
G. A. Mulligan CDFA, California Department of Food & Agriculture, Botany Laboratory.

Staff CDFA, California Department of Food & Agriculture, Botany Laboratory.

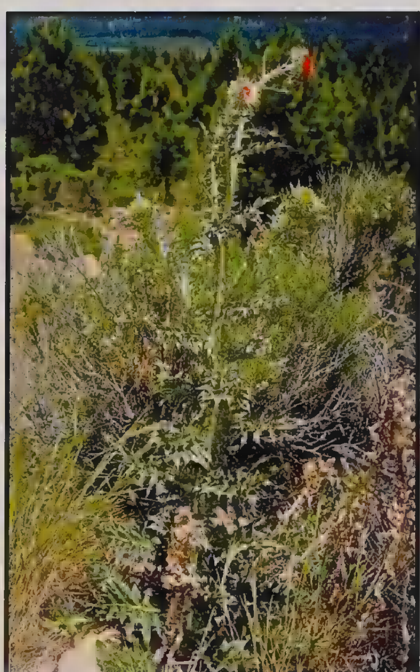
Canada Thistle *(Cirsium arvense)*
Staff CDFA, California Department of Food & Agriculture, Integrated Pest Control Branch.

Yellow Toadflax *(Linaria vulgaris)*
© Br. Alfred Brousseau, Saint Mary's College.

FIGURE 1-1 (1 of 2)
Abundant Noxious Weed Species

This page left intentionally blank.

Leafy Spurge *(Euphorbia esula)*
Staff CDFA, California Department of Food & Agriculture, Botany Laboratory.



Musk Thistle *(Carduus nutans)*
Staff CDFA, California Department of Food & Agriculture, Integrated Pest Control Branch.

FIGURE 1-1 (2 of 2)
Abundant Noxious Weed Species

This page left intentionally blank.

to 3,500,000 acres of new weed infestations in 1 year. The spread of weeds can primarily be attributed to human activities associated with vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and ineffective re-vegetation practices on disturbed lands (Callihan et al. 1991). Wind, water, birds, wildlife, and livestock also contribute to weed spread.

TABLE 1-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

Potential Invaders[1]	Potential Invaders[1] (continued)	New Invaders[2]	Established Invaders[3]
Yellow starthistle (Centaurea solstitalis)	Milium (*Milium vernale*)	Rush skeletonweed (*Chondrilla juncea*)	Spotted knapweed (*Centaurea maculosa*)
Purple loosestrife (*Lythrum salicaria*)	Eurasian watermilfoil (*Myriophyllum spicatum*)	Dalmation toadflax (*Linaria genistifolia*)	Canada thistle (*Cirsium arvense*)
Jointed goatgrass (*Aegilops cylindrica*)	Matgrass (*Nardus stricta*)	Yellow toadflax (*Linaria vulgaris*)	Musk thistle (*Carduus nutans*)
Skeletonleaf bursage (*Ambrosia tomentosa*)	Silver nightshade (*Solanum elaeagnifolium*)	Russian knapweed (*Acroptilon repens*)	Bull thistle (*Cirsium vulgare*)
Diffuse knapweed (*Centaurea maculosa*)	Buffalo bur (*Solanum rostratum*)	Sulfur cinquefoil (*Potentilla recta*)	Leafy spurge (*Euphorbia esula*)
Meadow knapweed (*Centaurea pratensis*)	Perennial sowthistle (*Sonchus arvensis*)	Hoary alyssum (*Berteroa incana*)	Black henbane (*Hyoscyamus niger*)
Poison hemlock (*Conium maculatum*)	Johnsongrass (*Sorghum halepense*)	St. Johnswort (*Hypericum perforatum*)	Hoary cress (whitetop) (*Cardaria draba*)
Field bindweed (*Convolvulus arvensis*)	Puncturevine (*Tribulus terrestris*)	Houndstongue (*Cynoglossum officinale*)	Common mullein (*Verbascum thapsus*)
Common crupina (*Crupina vulgaris*)	Syrian bean caper (*Zygophyllum fabago*)	Common tansy (*Tanacetum vulare*)	Cheatgrass (*Bromus tectorum*)
Scotch broom (*Cytisus scoparius*)		Tansy ragwort (*Senecio jacobaea*)	
Toothed spurge (*Euphorbia dentata*)		Dyers woad (*Isatis tinctoria*)	
Meadow hawkweed (*Hieracium pratense*)		Scotch thistle (*Onopordum acanthium*)	
Orange hawkweed (*Hieraclum aurantiacum*)		Bur buttercup (*Ranunculus testiculatus*)	
Perennial pepperweed (*Lepidium latifolium*)		Field pennycress *(Thlaspi arvense)*	
		Blue mustard *(Chorispera tenella)*	

[1] Potential invaders are not currently present on the S-CNF but are present in surrounding counties or states. The potential for their establishment on the S-CNF is high.
[2] New invaders are present on the S-CNF but are limited in distribution and numbers of locations. The potential for their further expansion on the S-CNF is high.
[3] Established invaders are present in high densities or are widely distributed on the S-CNF. The potential for their further expansion on the S-CNF is very high.

Noxious and undesirable weeds have established themselves throughout the Northwest, including the S-CNF where nine species with established populations and 15 species with new populations are known to infest more than 66,000 acres on more than 2,500 sites. It is likely many more infestations are yet to be discovered. Table 3-1 (in Chapter 3) summarizes the number of weed species, estimated acres, and number of sites of known weed infestations by Ranger District on the S-CNF, excluding the FCRONRW. Map 3-1 (back of Chapter 3) depicts inventoried noxious weed infestations on the S-CNF.

The North Fork Ranger District contains the greatest number of weed species (16) and acres of weed infestations (54,638) among the seven S-CNF Ranger Districts, followed by the Salmon-Cobalt Ranger District (13 species; 8,182 acres) (Table 3-1). Weed infestations on these two Ranger Districts together comprise approximately 94 percent of all inventoried noxious weed infestations on the S-CNF.

Table 3-1 also lists the three most abundant weed species (acres of infestations) within each S-CNF Ranger District. They are represented by a total of seven species, and include spotted knapweed, musk thistle, Canada thistle, bull thistle, leafy spurge, yellow toadflax, and sulphur cinquefoil. The three most abundant weed species within each Ranger District dominate that Ranger District's weed communities, collectively accounting for approximately 88 percent of all weed infestations on the Lost River Ranger District; 95 percent on the Leadore Ranger District; 99 percent on the Challis, North Fork, Salmon-Cobalt, and Yankee Fork Ranger Districts; and 100 percent on the Middle Fork Ranger District (Table 3-1).

Many weed species reproduce by sprouting from roots as well as by prolific seed production. Quigley and Arbelbide (1997) make reference to colonizer and invader noxious weeds. Colonizers tend to germinate under a wide range of environmental conditions, establish quickly, exhibit fast seedling growth, and, once established, out-compete native species for water and nutrients. Invaders can establish on relatively intact vegetative cover and displace native species without the aid of soil surface disturbance. Many of the most insidious noxious weed species (knapweeds, leafy spurge, rush skeletonweed, and yellow starthistle) have characteristics of both colonizers and invaders.

Most habitat criteria for weeds are fairly broad, which is one of the characteristics that makes these species so successful in adapting to new environments. Other general characteristics that often aid in the invasion and spread of weeds are their high reproductive potentials; adaptations to disturbed sites; allelopathic (toxic) compounds that provide weeds a competitive edge by suppressing growth of other vegetation; poisonous compounds, latex sap, barbs, or prickles that make weeds unpalatable; and/or their lack of natural enemies outside their native country and range. Because of the ability to invade or colonize new areas and a lack of natural predators to keep them in check, weeds can spread rapidly to non-infested areas.

Noxious and invasive weed expansion and establishment does not recognize ownership or administrative boundaries. Weeds that have become established on roadways are likely to encroach upon adjacent private croplands. Infestations on private lands are likely to encroach upon public lands and vice versa. The economic effects on private land productivity and treatment costs are considerable. Table 3-2 (in Chapter 3) lists the

species and acres of noxious weeds inventoried just outside the S-CNF boundaries that are associated with the S-CNF Ranger Districts. The presence of these weeds was documented as part of the overall database compilation for the proposed Noxious Weed Management Program on the S-CNF. Gathering near-Forest data such as these contributes to the cooperative weed management programs involving the Forest Service and neighboring counties like Custer County and Lemhi County, and is integral to the overall success of weed management on and near the S-CNF. Map 3-1 depicts weed infestations inventoried just outside the S-CNF that are listed in Table 3-2, as well as inventoried weed infestations on the S-CNF that are listed in Table 3-1. As more inventories are completed, weed acres and distribution will surely increase.

Inventoried weed infestations just outside the S-CNF total 8,934 acres and vary from 5,598 acres of weeds associated with the Leadore Ranger District (see Map 3-1) to 366 acres associated with the Yankee Fork Ranger District (Table 3-2). There were no inventoried off-Forest weed infestations associated with either the Challis or Middle Fork Ranger Districts. Spotted knapweed was the most abundant off-Forest weed species for the five Ranger Districts listed in Table 3-2, except for the Lost River Ranger District where spotted knapweed was second to leafy spurge in abundance. Thirteen other weed species were inventoried just outside S-CNF boundaries, with musk thistle, black henbane, hoary cress (whitetop), Canada thistle, and yellow toadflax among the more abundant species.

The degradation of public land resource values because of noxious weed infestations also has economic impacts. A study on the impact of spotted knapweed on Montana's economy (Hirsch and Leitch 1996) found that spotted knapweed infestations in wildlands have affected wildlife-associated recreation expenditures and soil and water conservation benefits. The direct impact on Idaho's economy has been estimated at more than $300 million annually (Idaho Strategic Plan for Managing Noxious Weeds, Idaho Department of Agriculture February 1999).

Data presented in Table 1-2 indicate how quickly weeds could potentially spread and dominate the S-CNF under the No Action Alternative. Five years from now, presently known weed infestations of approximately 66,000 acres would have doubled or tripled in size. Ten years from now, weeds would cover from over 200,000 acres (14 percent annual spread) to over 500,000 acres (24 percent annual spread) of the S-CNF. Twenty years from now, weeds would cover from just under 1,000,000 acres of the S-CNF at the most conservative spread rate (14 percent) to all of the S-CNF lands at the risk of invasion at the least conservative spread rate (24 percent).

These estimates are a sobering prediction of what could occur if treatment efforts remain at current levels.

TABLE 1-2
Estimates of Potential Acres of Noxious Weed Spread on the S-CNF Under the No Action Alternative (at Different Rates of Spread and Time Intervals)

Annual Weed Spread Rate (%)	Acres of Weed Infestations				
	Current Year (2002)	Year 5	Year 10	Year 15	Year 20
14	66,537	128,111	246,667	474,437	914,451
17	66,537	145,879	319,832	701,215	1,537,377
20	66,537	165,565	411,980	1,025,137	2,550,869
24	66,537	195,062	571,847	1,676,442	4,914,699*

*Exceeds total acreage of the S-CNF.

Noxious weeds negatively impact the natural plant communities they invade by reducing plant diversity and species richness, by decreasing the quality of habitat values for wildlife, and by overwhelming sensitive plant populations. Without aggressive treatment, noxious weeds would continue to displace native vegetation at the same or higher rates than currently. This would mean continued declines in plant diversity and species richness across native plant communities, particularly in the northern districts of the S-CNF where current infestations are heaviest. Declines in natural vegetative communities would result in declines in the quality of wildlife habitats. Populations of sensitive plant species in the path of weed expansion that could be expected to occur under less aggressive treatment would be impacted and probably overwhelmed by noxious weeds. Sensitive plant populations that are within or along the perimeter of the currently infested areas would have the highest potential to be negatively impacted.

The S-CNF must exercise responsible land management to prevent weed infestations from causing substantial habitat loss, with subsequent loss of plant diversity and ecosystem functions. Lack of effective weed management, in conjunction with the land use patterns around and within the S-CNF, will result in continued infestation onto Federally administered land from non-Federal land. Conversely, lack of effective weed management on some Federally administered land may infest neighboring non-Federal land or render weed control efforts on adjacent non-Federal land ineffective.

1.D. Proposed Action

1.D.1. Summary Description

a. Weed Treatment Objectives and Priorities

The overall management objective of the Proposed Action is to maximize the treatment of noxious and invasive weeds throughout the S-CNF using an IWM approach as quickly as reasonably possible to protect the forest and its resources. The S-CNF presently treats noxious weeds using IWM in conjunction with state and local agencies. This strategy is a holistic, *systems* approach to weed management. It involves the use of the best available management techniques to limit the impact and spread of the weed.

IWM typically includes strategies for awareness and education, early detection and proactive prevention of noxious weeds, the use of all treatment "tools" such as mechanical, biological, controlled grazing, and chemical management practices, followed by restoration and revegetation (cultural) (as appropriate) and monitoring of weed-impacted lands.

Weed treatment objectives under the Proposed Action of an IWM approach include eradication (elimination), control (reducing the population over time), and containment (preventing the population from spreading). Weed treatment priorities would be directed to where they have the greatest potential for removing or minimizing the adverse effects of weeds on other S-CNF resource values. Treatment priorities, in descending order, are as follows: 1) eradicate new populations of aggressive weeds; 2) control existing populations of aggressive weeds; 3) contain existing populations of aggressive weeds; 4) eradicate new populations of less aggressive weeds; 5) control existing populations of less aggressive weeds; 6) contain existing populations of less aggressive weeds; and 7) custodial (deferred) action. Levels of S-CNF funding, staffing, and other resource availability would ultimately determine the schedule for addressing and implementing treatment priorities. Weed treatment objectives and priorities are described in *Section 2.C.2, Treatment Objectives, Priorities, and Criteria.*

b. Weed Treatment Practices

The Proposed Action includes a full array of weed treatment practices: restoring and revegetating (where appropriate) sites; developing monitoring programs to follow treatment; implementing a broad range of mitigating BMPs and Standard Operating Procedures (SOPs); employing a site-specific minimum tool approach; and following an adaptive strategy in managing future weed infestations. Options for weed treatment that would be considered for use on a site-specific basis under the Proposed Action include a variety of mechanical, biological, controlled grazing, chemical (ground-based and aerial applications of herbicides), and combinations of these treatments. A number of non-treatment practices, which are a cornerstone of IWM programs, would continue under the Proposed Action. These IWM practices include proactive weed prevention programs; weed inventory and early detection; information and education programs; cooperative partnerships and coordination; and compliance with laws, orders, policies, and Forest Plans. Weed treatment practices are described in *Section 2.C.1, Treatment Practices.*

c. Mitigating BMPs and SOPs

BMPs for weed prevention and management that are followed by Region 4 of the Forest Service would be adhered to under the Proposed Action. In addition, BMPs and SOPs specifically associated with non-chemical weed treatments and with the ground-based and aerial applications of herbicides would be implemented as integral parts of the Proposed Action. These BMPs and SOPs are intended to avoid, minimize, or offset the potential for adverse impacts on S-CNF resources. Mitigating BMPs and SOPs are described in *Section 2.D.3, Management Practices and Mitigation Measures,* and Appendix A.

d. Restoration and Monitoring

Restoration and monitoring of treatment areas are integral components of the IWM program. Site restoration objectives include revegetating areas with desired vegetation where weeds have been eradicated, controlled, or contained; preventing future weed infestations; and slowing expansion of existing adjacent weed infestations. Implementation and effectiveness monitoring of treated and restored sites would be used to determine if the desired management objectives are being achieved, whether site restoration was successful, if follow-up treatments are needed, and to validate buffering effectiveness. Restoration and monitoring are described in detail in *Section 2.C.3, Restoration and Monitoring.*

e. Minimum Tool

Invasive weed treatments will incorporate the use of the "minimum tool" concept. During planning, S-CNF managers will select for use the minimum necessary method(s) to accomplish the weed management objectives at a specific site. If all treatment options are equally effective in controlling a particular species or infestation, the method with the least impact would be used. Parameters considered when selecting minimum tools include species biology, infestation size, proximity to water and recreation sites, and extent of sensitive habitats adjacent to infestations. The minimum tool would be determined using a site-specific implementation process and decision tree analysis that evaluates environmental parameters. Minimum tool is described in detail in *Section 2.C.5, Minimum Tool.* The site-specific implementation process and decision tree analysis are described in detail in *Section 2.C.6, Site-Specific Implementation Process.*

f. Adaptive Strategy

An adaptive weed management strategy would be employed to determine appropriate future actions to treat new populations of weeds, expansion of existing weed infestations, or weed infestations that have not yet been inventoried. The adaptive strategy would also cover any new weed species that occur on the S-CNF; any new federal-, state-, or county-designated species of noxious weeds; and any non-designated nuisance weeds present on the S-CNF. The process would include the following: 1) determine the weed species, level of aggressiveness, and infestation size; 2) determine the proximity to susceptible habitats, sensitive resources or species, administrative, or recreation sites; 3) determine a treatment priority level; 4) select and implement a treatment method using the site-specific minimum tool concept; and 5) conduct site restoration, monitoring, and assess follow-up needs. The scope of this EIS is intentionally broad relative to the issues and geographic scale analyzed in order to establish a basis for covering future weed treatments on the S-CNF using an adaptive strategy. Adaptive strategy is described more fully in *Section 2.C.4, Adaptive Strategy.*

g. Weed Treatment Acres, Sites, and Management Goals

Table 1-3 summarizes the acres of weed infestations on the S-CNF that would potentially be treated annually under the Proposed Action using various available treatment options. Estimates are based on the species of weeds present, their degree of aggressiveness, and the sizes and numbers of their infestations; corresponding treatment

priorities and objectives aimed at eradicating, controlling, and/or containing weeds; and treatment options available for various species of weeds.

The expected time frames and goals for accomplishing the Proposed Action management objective would vary depending on the extent and severity of weed infestations. As discussed in Chapter 2, known acres of weed infestations are considerably greater on the North Fork and Salmon-Cobalt Ranger Districts (primarily spotted knapweed infestations) than on the other five S-CNF Ranger Districts and may, therefore, require more time to achieve weed management goals. The following management goals are proposed for the S-CNF Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100 percent.
- Reduce established infestations of aggressive weeds greater than 25 acres in size by 50 percent.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment under the Proposed Action would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. Future, presently undefined weed infestations would be treated using the adaptive strategy approach. For purposes of analysis in this Final EIS, it has been assumed that full funding would be available for implementing the Proposed Action to work toward achieving those goals. *Section 2.C, Integrated Weed Management*, describes these objectives in detail.

1.D.2. Scope of Proposed Action and Analysis

The full scope of the Proposed Action is described in detail in Chapter 2 of this Final EIS. Activities could occur in all S-CNF Ranger Districts described in the Challis National Forest Plan and the Salmon National Forest Plan, exclusive of the FCRONRW.

The analysis of effects in this Final EIS includes those occurring from the entire "scope" of the project. Scope is the range of actions and potential impacts that this EIS considers, varying from actions that have no impact, to direct and indirect impacts, to those that may have cumulative impacts (for example, potential weed invaders present near but outside S-CNF boundaries).

1.D.3. Selection of the Preferred Alternative

The Forest Service has selected the Proposed Action as the Preferred Alternative based on analyses presented in this Final EIS. The Proposed Action would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources.

1.E. Management Direction

1.E.1. Relationship to Salmon and Challis National Forest Plans

Activities planned in the National Forest System involve two different levels of decisions: a general (programmatic) decision for an entire National Forest planning area and a site-specific decision for a specific project area. Relative to this EIS, the programmatic decisions are the Forest Plans prepared by the Challis National Forest in 1987 and the Salmon National Forest in 1988, before the two forests were combined administratively in 1995. Congressional authority did not occur until 2000. Both Forest Plans include a Final EIS that reviews the general cumulative effects of anticipated actions on a landscape level for such resource values as roadless areas, wildlife populations, and water quality of major drainages. The Forest Plans also establish standards to protect the environment. These standards are used as the basis to develop mitigation measures for the Proposed Action and alternatives addressed in this EIS. They are also used to measure the effect of the actions to ensure that those actions are in compliance with the Forest Plans.

This EIS is the specific decision-making tool to update and integrate weed management activities on the S-CNF. The S-CNF Noxious Weed Management Program EIS is not a general management plan for the project area or a programmatic EA. It is a linkage between the Forest Plans, weed management activities, and requirements established by NEPA.

Analyses in this EIS are not at the site-specific weed infestation level, but instead focus on treatment-specific and weed species-specific activities at a slightly broader scale with specific guidelines and restrictions regarding what treatments can or cannot be used and why. The types of clearances, BMPs, and SOPs to be used to avoid or minimize the potential for impacts are included, together with mitigation measures to compensate for unavoidable impacts, where appropriate. This information will be used by the Responsible S-CNF Official to make decisions for managing weeds on the S-CNF.

TABLE 1-3

Estimated Acres of Weed Infestations to be Treated Annually and Possible Treatment Options on the S-CNF for the Proposed Action[1,2]

	Possible Treatment Options									
	Mechanical	Biological	Chemical	Mechanical and Chemical	Biological and Chemical	Grazing and Chemical	Mechanical and Biological	Mechanical and Grazing	Bilogical and Grazing	Total Acres
Proposed Action	100	2,600	13,600	100	1,200	100	100	100	100	18,000

[1]Excludes the Frank Church River of No Return Wilderness.

[2]Estimated treatment acres based on values contained in Appendix B and information contained in Appendices C and J.

Both the Salmon National Forest (U.S. Forest Service 1987b) and Challis National Forest (U.S. Forest Service 1989) prepared EAs for weed control based on the Forest Plans in the late 1980s. These EAs adopted IPM concepts outlined in Regional National Forest weed control programs and the Forest Plans. The Salmon National Forest Plan provided: "Noxious weeds will be controlled as needed to protect and enhance the value of other resources and to comply with State law. ... IPM, the concept of using interdisciplinary expertise to plan for and implement a control program using a combination of biological, mechanical, chemical and preventive management will be emphasized." More recent reports have noted the need for "new standards and guidelines in the Forest Plan." The current trend focuses treatment strategies on IWM, a subset of IPM.

1.E.2. Noxious Weed Management Philosophy

IWM incorporates planning and cooperative control strategies between S-CNF personnel and state and county weed control efforts. Presently, S-CNF managers work with the Lemhi, Butte, and Custer Counties' community-based weed management organizations, CWMAs, and the INWCC to coordinate planning and control efforts. This coordination effort is an important part of future weed management strategies. Also, as noted in the summary description of the Proposed Action, future weed management philosophy on the S-CNF would include use of the minimum tool approach as part of a site-specific implementation process when selecting a weed treatment method, and use of an adaptive weed management strategy for treating future, presently undefined weed infestations.

1.E.3. Laws, Regulations, and Policies for Noxious Weed Management on National Forests

The Federal Noxious Weed Act of 1974 requires agencies to develop programs to eradicate undesirable plants and "establish and adequately fund an undesirable plants management program through the agency's budgetary process; complete and implement cooperative agreements with state agencies regarding the management of undesirable plant species on Federal lands under the agency's jurisdiction; and establish integrated management systems to control or contain undesirable plant species targeted under cooperative agreements." (7 USCA § 2418). In addition, federal law requires agencies to consult with state and local agencies to develop a coordinated weed management effort.

Under Idaho's Noxious Weed Control Act (I.C. § 22-2401 *et. seq.*), it is unlawful for an individual to allow noxious weeds to propagate or go to seed on their land unless they are complying with an approved management plan. The law directs counties to develop weed control districts to plan and implement weed control efforts. County weed boards must make all reasonable efforts to develop and implement a noxious weed program covering all land within the district owned by the Federal government. Idaho's noxious weed statutes and regulations require coordinated efforts among the state, agencies, and counties to control designated noxious weed populations.

The 1998 *Forest Service Strategy for Noxious and Nonnative Invasive Plant Management* provides the Forest Service with a "roadmap into the future for preventing and controlling the spread of noxious weeds and non-native invasive plants." Presidential

Executive Order #13211 (February 1999) directs Federal agencies to conduct activities that reduce invasive weed populations.

1.F. Interrelated Projects

The State of Idaho has organized CWMAs (see *Section 1.A.2*). The INWCC coordinates statewide weed management efforts. Additionally, a recent State Executive Order established the Idaho Invasive Species Council to "provide policy level direction and planning for combating harmful invasive species infestations throughout the state and for preventing the introduction of others that may be potentially harmful." (Executive Order 2001-11, September 26, 2001). The Council includes representatives from Federal agencies (including the Forest Service) and the five Native American tribal governments in Idaho.

Under Idaho's Noxious Weed Management strategy, counties are required to develop local weed control management strategies. Butte, Lemhi, and Custer Counties all have IWM plans (Butte Soil and Water Conservation District 2001).

1.G. Supporting Documents and Past Analysis

This Final EIS is supported by the following documents, and incorporates their findings: Monitoring and Evaluation Report 1998 and 1999 (U.S. Forest Service 1999b); the FCRONRW Final EIS and Record of Decision (U.S. Forest Service 1999a); the Final EIS and Land Resource Management Plan for the Challis National Forest (U.S. Forest Service 1987a); the Final EIS and Land Resource Management Plan for the Salmon National Forest (U.S. Forest Service 1988a); the EA for the Noxious Weed Control Program, Salmon National Forest (U.S. Forest Service 1987b); the EA for Noxious Weed and Poisonous Plant Control, Challis National Forest (U.S. Forest Service 1989); the Intermountain Region Noxious Weed and Poisonous Plant Control Program Final EIS (U.S. Forest Service 1986); three sub-basin assessments (Upper Salmon, Lemhi, and Pahsimeroi) and numerous watershed assessments; and the Salmon-Challis National Forest Noxious Weed Management Program Draft EIS (U.S. Forest Service 2002d). These documents are available at the S-CNF offices in Salmon, Idaho. Other helpful documents include the Butte, Custer, and Lemhi Weed Management Plans, and the State of Idaho's Noxious Weed Strategic Plan. These documents are available on the internet and at the county extension offices.

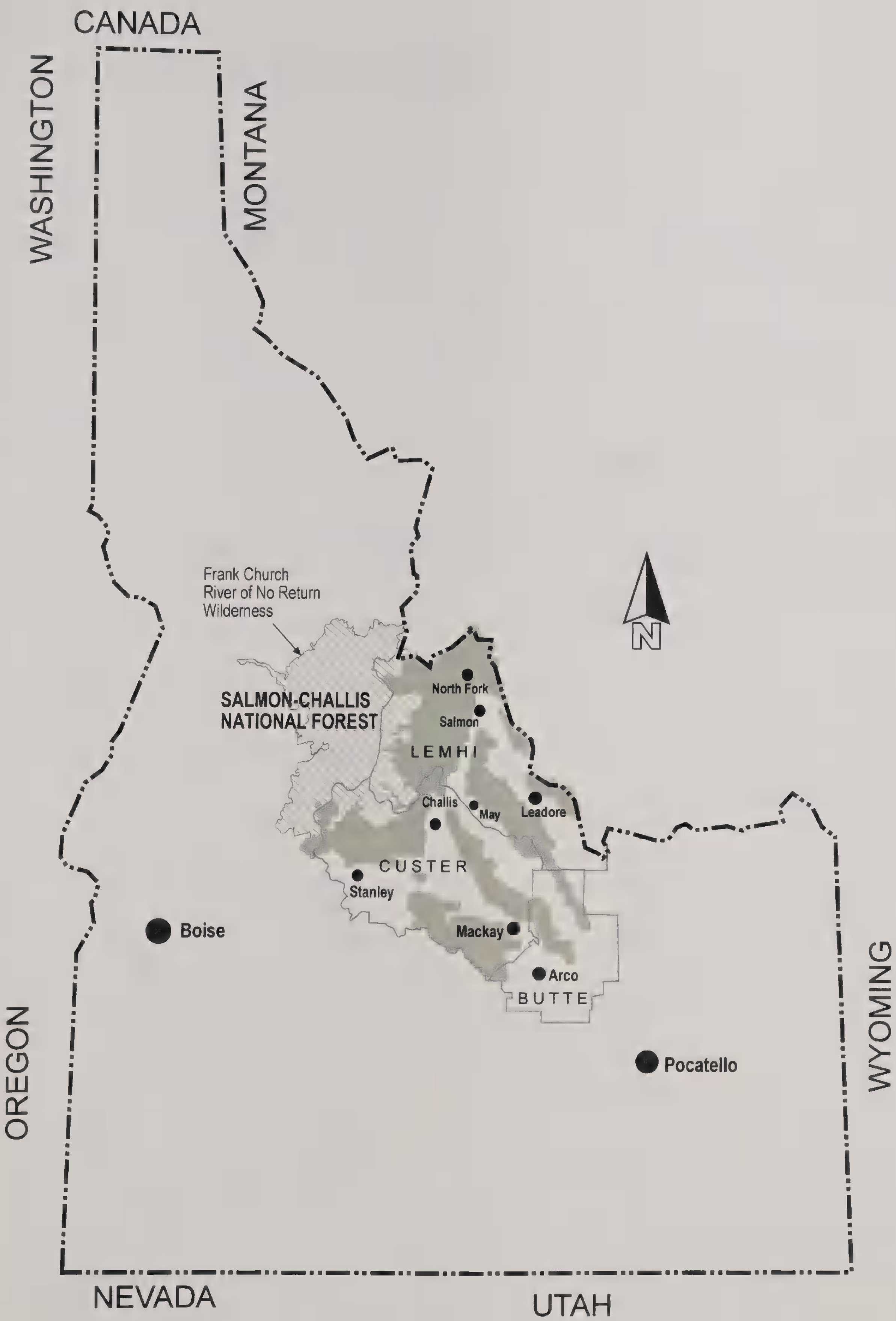
This Final EIS also is supported by the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The ICBEMP was established in 1994 to develop a scientifically sound ecosystem-based strategy for managing forested lands east of the Cascade Mountains. Jointly managed by the Forest Service and the Bureau of Land Management (BLM), the ICBEMP data assess the physical, biological, and social conditions of the large-scale Columbia River Basin area. The recent ICBEMP Final EIS and Proposed Decision "incorporate restoring and maintaining ecosystems across the project area and providing for the social and economic needs of people, while reducing short- and long-term risks to natural resources from human and natural disturbances. An emphasis on conducting analyses, such as Subbasin Review and Ecosystem Analysis at the

Watershed Scale (EAWS), prior to conducting management activities is intended to minimize short-term risk from management activities in areas where short-term risks are of most concern, and to ensure actions occur in the most appropriate locations in the most appropriate sequence." (ICBEMP Proposed Decision 2000).

The ICBEMP effort recognizes the need for coordinating weed control efforts, and suggests that management decisions about weed control continue as a collaborative effort on Federal, state, and local levels. The ICBEMP Final EIS is available on the internet and at the county extension offices.

1.H. Decision Framework

The S-CNF Supervisor will issue a Record of Decision (ROD) based on this Final EIS, which has been prepared following the public review of the Draft EIS. The ROD will document what treatment actions, if any, should be taken to control weeds on the S-CNF, where treatment should be applied, what type of treatment(s) should be used, and when treatment will occur.



MAP 1-1
Salmon-Challis National Forest
Location Map

THIS PAGE LEFT INTENTIONALLY BLANK

Chapter 2. Alternatives

2.A. Introduction

This chapter describes the development, formulation, and structure of alternatives analyzed in detail for the proposed S-CNF Noxious Weed Management Program. It also describes alternatives that were considered but eliminated from detailed analysis and the reasons for their elimination. The alternatives development discussion summarizes the public involvement process, issues, and concerns identified by the public during project scoping, and the evaluation of those issues in the development of alternatives. Components of the Forest Service's IWM Program that were used to formulate the various alternatives analyzed in detail are described. Examples of IWM components include weed treatment and non-treatment practices, treatment objectives and priorities, site restoration and monitoring, an adaptive weed management strategy, and a minimum tool approach. Alternatives analyzed in detail and their structure, including mitigation measures where appropriate, are described. They include a Proposed Action, two action alternatives, and a No Action Alternative (No Change from Current Management). Map 2-1 (back of Chapter 2) shows the S-CNF boundary and Ranger Districts, excluding the FCRONRW.

2.B. Alternatives Development Process

2.B.1. Preliminary Range of Alternatives

A preliminary range of six alternatives conceptually covering various combinations of possible noxious weed management strategies was initially identified by the Weed EIS Analysis Content Team for consideration. The alternatives included four action alternatives, a No Action Alternative, and a No Treatment Alternative. NEPA regulations require analysis of a No Action Alternative in an EIS even though it may not meet project purpose and need. The No Action Alternative provides a basis for evaluating and comparing the environmental effects, both beneficial and adverse, of the other alternatives. Whether any of the six preliminary alternatives (and any other alternatives identified thereafter) would receive detailed analysis in the Draft EIS and in this Final EIS depended on comments subsequently received from the public during scoping, and a determination of how well (or whether) the alternatives would meet project purpose and need.

The six preliminary alternatives presented at the public scoping meetings included the following:

- Alternative A—No Action Alternative (No Change from Current Management)
- Alternative B—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments

- Alternative C—Ground-Based Herbicide Application Plus Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments (No Aerial Herbicide Application)
- Alternative D—Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments (No Herbicide Application)
- Alternative E—Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments Followed by Herbicide Application if These Treatments are Unsuccessful
- Alternative F—No Treatment Alternative (Discontinue Current Weed Management Program)

2.B.2. Public Involvement

Public involvement formally began with the publication of a NOI to prepare a Draft EIS for a proposed noxious weed management program on the S-CNF, excluding areas within the FCRONRW. The NOI was published in the Federal Register (Vol. 66, No. 24, pp. 64799-64800) on December 14, 2001. It provided information on the background (needs) and purposes of the proposed project, announced and provided information on public scoping meetings, and requested public comments on the proposed project. During the week of December 14, the proposed project also was described in the S-CNF quarterly report of the Schedule of Proposed Actions (SOPA) and was displayed on the S-CNF website, http://www.fs.fed.us/r4/sc, under "current projects."

A project scoping letter was mailed to 502 individuals, interest groups, local governments, and other agencies on December 18, 2001. This mailing list was compiled from the S-CNF's SOPA list, scoping mailing lists from previous S-CNF projects, and various lists of permit holders from both the S-CNF and the BLM. The scoping letter included a self-addressed comment card to be returned to the S-CNF, with or without specific comments, in order to be maintained on the project mailing list. The Shoshone-Bannock Tribes were sent a government-to-government letter on January 15, 2002, describing the project and requesting input.

Three public scoping meetings were held in the three local communities surrounding the project area in early January 2002. The first scoping meeting was in Arco, Idaho, on January 8, the second in Challis, Idaho, on January 9, and the third in Salmon, Idaho, on January 10. Notices of the public meetings appeared in the three local newspapers (Arco Advertiser, Challis Messenger, and Salmon's Recorder Herald) during the week of December 24, 2001. Notices of the public meetings also were announced over the local radio stations in Salmon and Challis the week of January 1, 2002. The meetings were only lightly attended by the public, including three individuals in Arco, six in Challis, and one in Salmon. Most of the attendees provided written comments either during the meeting on the comment form provided or by mail (and/or e-mail) at a later date. Notes describing issues and concerns raised by the public were recorded at each meeting and a sign-in list was distributed. Additional information on the public involvement process for the proposed project is provided in *Chapter 5, Consultation and Coordination*.

2.B.3. Public Responses and Concerns

A total of 25 individuals or organizations responded with 88 written comments on the proposed project as a result of public scoping. The S-CNF Weed EIS Content Analysis Team reviewed and placed each comment into one of several categories based on subject matter, context, content, and intent. Of the 88 written comments received, 18 were considered "statements" that reflected an interest, idea, suggestion, or feeling that did not lead to an issue. The remaining 70 comments were construed as concerns, some of which contained underlying "issues" that led to points of discussion, debate, or dispute. These were categorized into the following eight groupings:

- 24 comments were on a variety of subjects that had been previously incorporated into the framework of this EIS;
- 15 comments fit one or more of the criteria on non-significance (six being outside the scope of this EIS, eight being already decided by law, regulation, policy, or Forest Plan, and one being conjectural without scientific support);
- Eight comments reinforced a variety of subject matter that must receive adequate consideration in the EIS, focusing on analysis, mitigation, and disclosure of potential impacts;
- Seven comments supported several of the preliminary draft alternatives presented at the public scoping meetings, as follows:
  - Six comments supported Alternative B—Aerial and Ground-based Herbicide Applications Plus Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments.
  - One comment supported Alternative E—Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments Followed by Herbicide Applications if These Treatments are Unsuccessful.
- Seven comments wanted the EIS to include provisions to allow flexibility to include new chemicals, new treatment areas, and new target plant species;
- Six comments supported an additional alternative that focused on a proactive prevention approach to weed management, taking action on numerous human uses known to cause site disturbance, spread seeds, and exacerbate weed expansion (roads, logging, grazing, mining, off-highway vehicles [OHVs]);
- Two comments opposed Alternative F—No Treatment (Discontinue Current Weed Management Program);
- One comment opposed livestock grazing as a treatment.

The Weed EIS Content Analysis Team concluded that three of the above groupings of scoping comments needed to be reviewed for further consideration and follow-up action. These are:

1. Include provisions in the EIS for flexibility in including additional chemicals, new treatment sites, and new target species (seven comments).

2. Further review and follow-up on the specified subject matter (e.g., analysis, mitigation, and disclosure) to ensure the EIS provides appropriate inclusion and consideration (eight comments).

3. Consideration of an additional alternative (a "Proactive Prevention Alternative"), whether it has merit, is within the scope of this EIS, and has legal and policy standing, and, if not, provide rationale for its dismissal as an alternative considered but eliminated from detailed analysis (six comments).

The written comments also were grouped into eight topics that either related to potential issues, stated a preference for specific alternatives, or expressed a desired direction or content for specific alternatives. Twenty-two of the 25 responders included comments relating to one or more of the following eight topics. These eight topics are summarized below along with the number (x) and percent of the 22 responders who commented:

1. Opposed to any road or trail closure: (5), 22.7 percent

2. Request provisions in EIS for flexibility in chemical use, acres treated, and sites treated: (4), 18.2 percent

3. Favor Alternative B (full use of all weed control strategies): (4), 18.2 percent

4. Request consideration of new alternative ("Proactive Prevention Alternative") focusing on eliminating human-caused weed spread and establishment activities: (3), 13.6 percent

5. Favor road closures (not related to proponents of the "Proactive Prevention Alternative"): (2), 9.1 percent

6. Opposed to Alternative F (No Treatment Alternative): (2), 9.1 percent

7. Favor Alternative E (no chemical use except as a last resort): (1), 4.5 percent

8. Opposed to livestock grazing as a weed treatment action: (1), 4.5 percent

2.B.4. Issues

Based on comments received from the public during and following scoping meetings (see *Section 2.B.3, Public Responses and Concerns*), there appears to be little opposition regarding the use of chemicals or livestock as weed treatment options on the S-CNF. In addition, it appears there is support for using the full array of weed treatment options and the need to include provisions for chemical use, acreage, and treatment site flexibility on the S-CNF.

Although there is acceptance to the use of chemicals in the treatment of noxious weeds, there is still a concern over the environmental and health risks herbicides pose. However, in general, the public recognizes that noxious weeds pose a greater threat to the physical, biological, and ecological environment of the S-CNF. These environmental and health concerns led to the development of six key issues listed below that are fully addressed in each of the four alternatives analyzed in detail.

1. Potential effects on wildlife habitat, fisheries, native plant communities, threatened/endangered/sensitive (TES) species, vegetation diversity, and ecosystem function because of noxious weeds.

2. Potential effects on wildlife species and their habitat from ground and aerial applications of herbicides.
3. Potential effects on fisheries and aquatic habitat from ground and aerial applications of herbicides.
4. Potential effects on TES terrestrial and aquatic species from ground and aerial applications of herbicides.
5. Potential effects on TES plant species from ground and aerial applications of herbicides.
6. Potential effects on human health from ground and aerial applications of herbicides.

There also seems to be reasonable support from the public (13.6 percent of those who responded) for the need to address human-caused activities or uses that lead to or exacerbate weed expansion, encroachment, and establishment, namely, livestock grazing, logging, roads, mining, and recreation (OHVs). These concerns led to an additional issue:

7. Human uses exacerbate the spread and establishment of noxious and invasive non-native weeds. Without a proactive prevention strategy that limits, modifies, or curtails current human uses on the S-CNF, any type of physical treatment will not be successful in controlling weeds.

This issue led to the development and consideration of an additional alternative—the Proactive Prevention Alternative—that alters the original intent and scope of weed treatment activities and focuses on taking action on numerous human use activities as a means to actively prevent the establishment and spread of weeds, while at the same time incorporating the full range of weed treatment activities where absolutely necessary.

The public comments did not lead to any additional key issues not already identified nor any non-key issues requiring further discussion.

2.B.5. Development of Alternatives

Alternatives were developed based on an understanding of project purpose and need, issues identified by the public during and following scoping meetings, and Council on Environmental Quality (CEQ) regulations for implementing the provisions of NEPA. CEQ regulations (CEQ 1978, 1983) provide important guidelines on developing and evaluating alternatives in regard to meeting project purpose and need. These regulations require that federal agencies rigorously explore and evaluate all "reasonable" alternatives. CEQ regulations also stress that agencies not disregard the "common sense realities" of a given situation in developing alternatives. In addition, when considering the range of viable alternatives, agencies should seek a reasonable range of practical and feasible alternatives that will accomplish project objectives. Action alternatives that fail to meet project purpose and need do not need to be analyzed in detail in an EIS (CEQ 1978, 1983).

Based on CEQ regulations and guidelines, the defined project purpose and need, the preliminary range of alternatives presented to the public, and scoping comments received from the public, a final set of alternatives was developed and include:

- No Action Alternative (No Change from Current Management)

- Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments
- Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)
- Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

These alternatives are described in detail in *Section 2.D, Alternatives Analyzed in Detail,* of this chapter. Alternatives considered but eliminated from detailed analysis include: the No Treatment Alternative (Discontinue Current Weed Management Program); the Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments Followed by Herbicide Applications if These Treatments are Unsuccessful Alternative; and the Proactive Prevention Alternative, which are described in detail in *Section 2.E, Alternatives Considered but Eliminated from Detailed Analysis,* of this chapter.

2.C. Integrated Weed Management

All of the alternatives analyzed in detail are based on an IWM approach. As noted in Chapter 1, *Purpose and Need,* this approach is part of a larger IPM approach (as defined in Forest Service Handbook 3409) that the S-CNF follows in managing various pests, including noxious and invasive non-native weeds. IPM practices are based on the principle that a single management approach will not be successful, but that implementing a fully integrated approach to weed management significantly improves the chances of a successful program.

A variety of methods and activities can be carried out under an IWM program that provides a full range of weed management strategies. These are described in the following text and include various weed treatment practices; weed treatment objectives, priorities, and criteria; restoration and monitoring programs; an adaptive strategy for future weed management; and a "minimum tool" weed treatment concept. Specific management tools that would be selected from these methods and activities and implemented under each of the alternatives analyzed in detail are described in *Section 2.D, Alternatives Analyzed in Detail,* in this chapter. Other components equally important in an IWP program, including non-treatment practices such as weed prevention, education, and coordination measures as well as mitigation measures and BMPs, also are described in *Section 2.D, Alternatives Analyzed in Detail,* of this chapter for each alternative analyzed in detail.

2.C.1. Treatment Practices

Treatment practices available for use in eradicating, controlling, and/or containing noxious, invasive, and non-native weeds include mechanical, biological, controlled grazing, chemical (aerial and ground-based), and combinations of these treatments. Cultural treatment is discussed further below as a part of site restoration techniques. Selection of the most appropriate treatment practice depends on numerous factors, including the risk of weed expansion, weed species biology, time of year, environmental setting, soil type, and management objective. The anticipated types, mix, and extent of treatment practices and the

management objective associated with each alternative are presented in *Section 2.D, Alternatives Analyzed in Detail.*

Treatment practices described in the following text could potentially be used on the S-CNF and would be considered on a site- and weed-species-specific basis. Treatment descriptions are based on recent NEPA documents covering noxious weed management programs on nearby National Forests. These documents cover the former Salmon National Forest (U.S. Forest Service 1987b) and Challis National Forest (U.S. Forest Service 1989) (now the Salmon-Challis National Forest, Idaho); FCRONRW, Idaho (U.S. Forest Service 1999a); Flathead National Forest, Montana (U.S. Forest Service 2000a); Sandpoint Ranger District, Idaho (U.S. Forest Service 2001d); Beaverhead-Deerlodge National Forest, Montana (U.S. Forest Service 2001a); and Lolo National Forest, Montana (U.S. Forest Service 2001c).

a. Mechanical Treatment

Mechanical treatment consists of methods that physically destroy, disrupt growth, or interfere with the reproduction of noxious and invasive non-native weeds. These methods can be accomplished by hand, hand tool, or power tool and may include pulling, grubbing, digging, hoeing, tilling, cutting, mowing, and mulching weeds. Mechanical treatment also could include burning weeds with a propane torch. Mechanical treatments would typically be used on a limited basis, primarily to control individual plants or very small, isolated infestations of weeds. Larger infestations of weeds are very difficult to control with mechanical treatment. Furthermore, steep slopes and rocky soils prohibit or limit the use of many mechanical treatment activities.

Hand pulling and grubbing of weeds is the oldest form of weed treatment, but it is very labor intensive, relatively ineffective in treating large infestations of perennial weeds, and often leaves root fragments in the ground. If sufficient root mass is removed, the individual plant can be destroyed. However, some weed species such as leafy spurge respond to mechanical treatment by aggressively resprouting, even if small root fragments are left in the soil. This type of treatment is much less effective on rhizomatous than non-rhizomatous weed species because of their well-developed root system and carbohydrate reserves.

Cutting and mowing plants can reduce reproduction in perennial species and weaken their competitive advantage by using up carbohydrates stored in the root systems. Mechanical treatments must be repeated several times a year for many years to eradicate weed species that are prolific seed producers and have built up a residual seed bank in the soil. To be most effective, mechanical treatment must occur before seed production occurs. Plants that have already flowered must be removed from the treatment area and destroyed. For the above reasons, mechanical treatments are difficult or impossible to implement and achieve success on large weed infestations, rhizomatous invasive weeds, and steep and/or remote terrain.

Studies on the Lolo National Forest in western Montana (U.S. Forest Service 2001c) provide valuable information on the effectiveness, effort, and cost associated with several mechanical treatments of spotted knapweed, by far the dominant weed species on the S-CNF. The effects of mowing and pulling were analyzed on test plots established on two spotted knapweed stands with 76 percent cover and 53 percent cover. Mowing spotted knapweed once during the early bud stage and again during the late bud stage provided

99 percent flower control but 0 percent plant reduction. Pulling spotted knapweed provided 100 percent flower control, 56 percent plant control, and increased the proportion of bare ground from approximately 3 percent to 14 percent. Annual costs were $200 per acre for mowing knapweed and $8,372 per acre for pulling knapweed. Extrapolating study results of pulling knapweed to a larger area, the analysis estimated that a 1,000-acre area heavily infested with spotted knapweed would contain approximately 170 million adult plants. It was also estimated that because spotted knapweed has extensive seed banks, the 1,000-acre area would have the potential to produce 600 billion new plants over a 10-year period. Based on these estimates, it was calculated that 1,000 hand pullers would each have to harvest approximately 600 million plants for 10 years to diminish a spotted knapweed population of 170,000 adult plants per acre covering a 1,000-acre area (U.S. Forest Service 2001c).

b. Biological Treatment

This treatment consists of using biological controls (agents) such as insects and plant pathogens to attack, weaken, and kill a targeted weed species and reduce its competitive or reproductive capacity. Natural limiting factors such as predators (animals, insects), disease, and other vegetation competing for nutrients, moisture, space, and light generally prevent populations of native plants from spreading out of control. Non-native plant species have become a problem in parts of the western U.S. because of the absence of limiting factors that are present in their native habitats.

Biological controls are used to reduce densities and rates of weed spread rather than to eradicate weeds. Biological controls may decrease the production of viable weed seed and may slow the rate of weed spread, but by themselves do not completely eradicate or contain noxious weed infestations. This treatment is most effective on dense infestations of a weed species covering large areas, but it may take 10 to 20 years for some biological treatments to be effective (U.S. Forest Service 1999a). Other limitations in the use of biological controls include the following: weeds continue to spread while the biological controls are becoming established; some weed species do not have biological controls; populations of biological controls can fail (leave an area or die); and a mix of different species of biological controls is often necessary to effectively treat a given weed site.

Most experts regard the introduction of biological controls as the best long-term solution where there are large, widespread populations of a specific noxious weed species (U.S. Forest Service 2001d). Cycles of abundance for the noxious weed and biological control agent typically follow patterns associated with density-dependent relationships between predator and prey, and ideally result in equilibrium between the biological agent and the weed. This treatment is more effective when used in combination with, or prior to, other treatment methods such as herbicides.

The U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) rigorously screens and tests new biological agents for impacts on agricultural plants and on threatened, endangered, and sensitive plant species. It then prepares environmental assessments on the possible impacts of releasing those agents (U.S. Forest Service 1999a). Before the prospective biological controls can be released, they are placed in quarantine under "eat or starve" conditions with a variety of plant species to determine if they are host-specific to the plants they are intended to control. Insects are generally the most popular and

available biological agents. Only APHIS-approved biological controls would be used on the S-CNF and would be released according to APHIS requirements or Forest Service policy, whichever is more restrictive.

Examples of biological controls that could potentially be used on the S-CNF include the following: for spotted knapweed—seed gall fly (*Urophora affinis)*, root moth (*Agapeta zoegana)*, flower weevil (*Larinus minutus)*, root boring weevil (*Cyphocleonus achates*), and seedhead moth (*Metzneria paucipunctella);* for rush skeletonweed—gall midge *(Cystiphora schmidti*), gall mite (*Eriophues chondrillae*), and rust *(Puccinia chondrillina*); for St. Johnswort—beetle (*Chrysolina hyperici*) and moth (*Aplocera plagiata);* and for leafy spurge—flea beetles (*Aphthona* spp*.)*. Optimal biological management would include a combination of different biological agents that attack or stress different parts of a weed's system, such as noted for the four agents for spotted knapweed. New, APHIS-approved biological controls may be substituted for current agents if more appropriate, or if current agents are no longer available or APHIS approved.

c. Controlled Grazing Treatment

This treatment category consists of controlling localized infestations of weeds by livestock grazing. Where appropriate, livestock grazing would be integrated with other weed treatments described in this section to achieve more effective weed control. Although it can be somewhat seasonal in application, prolonged or coerced grazing by certain kinds of livestock has been used to suppress noxious weeds (Crabtree and Lake 2001). For example, sheep can be induced to eat leafy spurge, which is toxic to some livestock but not to sheep (or goats). Sheep are known to suppress leafy spurge populations, but they usually do not totally eradicate this weed and will not always graze leafy spurge to the exclusion of native grasses. Also, sheep grazing leafy spurge (and other weeds) while the seed is maturing will pick up seeds in their fleece, possibly infesting weed-free areas. Goats have been used on a limited basis in efforts to control weeds on portions of nearby lands administered by the BLM Salmon Field Office. Hay, water, or minerals can be used to attract livestock to the weed patch.

Weed control using livestock grazing would be conducted in accordance with Forest Service Grazing Regulations and Regional Policy. A site-specific project operation plan would be developed for the treatment area that would consider various factors such as target weed species, type of livestock to be used, forage preference, planned grazing intensity, herding characteristics, topography, onsite water, season of use, and a monitoring program. Forest Service regulations, policies, and the appropriate BMPs (Appendix A) would be followed and the project operation plan would be strictly adhered to during all livestock grazing weed treatment efforts.

d. Chemical Treatment

Chemical treatment is an important method when the management objective is weed eradication or control. It involves the application of herbicides (chemical compounds) at certain stages of plant growth to kill weed species. Herbicides are extensively screened and tested before they are approved and registered for use by the U.S. Environmental Protection Agency (EPA). Such registrations typically require at least 120 tests over a 7- to 10-year period and can cost approximately $30 million to $50 million (U.S. Forest Service 2001c).

Herbicide labels carry the force of laws governed by federal and state agencies. Labels contain information on the proper administration of each herbicide, including the following: a list of the ingredients; EPA registration number; precautionary statements (hazards to humans and domestic animals, personal protective equipment, user safety recommendations, first aid, and environmental hazards); directions for use, storage, and disposal; mixing and application rates; approved uses and inherent risks of use; limitations of remedies; and general information. The S-CNF has used the ground-based application of herbicides in its IWM program since 1989 and strictly complies with all label requirements governing herbicide use and application.

There are a variety of types of herbicides, and many have been limited in their use by the EPA or the Occupational Safety and Health Administration (OSHA). Many herbicides are "selective" and kill specific types of plants, while others are "general" and kill almost all actively growing plant species contacted. Most herbicides are not truly selective at the species level, but will selectively kill forbs or certain groups of species. Some of these herbicides are pre-emergent and absorbed through the roots while most herbicides affect the established plant through foliar and root absorption.

Herbicides that could potentially be used to control weeds on the S-CNF include those active ingredients in chemicals approved and currently being used in ground-based herbicide applications on the S-CNF (2,4-D amine, glyphosphate, picloram, and dicamba) (U.S. Forest Service 1987a; 1989) and/or other EPA-registered and approved chemicals, as appropriate, for weed control, such as Transline (active ingredient is clopyralid), Scythe (pelargonic acid), and WOW (corn meal). It is anticipated that the herbicides described in the following text would be among the primary chemicals used in those alternatives analyzed in this EIS that include the chemical treatment of weeds. All alternatives involving the use of herbicides will have the flexibility to: 1) use any chemicals appearing on the Forest Service's list of herbicides approved for use on National Forests, and 2) use any new or updated chemicals as they are registered and approved by the EPA and added to the Forest Service's list of herbicides approved for use and accompanied by complete risk assessments.

Selection of a herbicide for site-specific application under those alternatives would depend on its chemical effectiveness on a particular weed species, success in previous similar applications, habitat types, soil types, nearness of the weed infestation to water, and the presence or absence of sensitive plant, wildlife, and fish species. Because of environmental concerns, it is essential that all herbicide applications follow label instructions, specifications, and precautions as well as applicable Forest Service policy. In instances where herbicide label, federal, or state stipulations overlap, the more restrictive criteria would apply. Additional fact sheet information, such as characteristics and risks, on the herbicides described below and other registered chemical herbicides can be reviewed at http://infoventures.com/e-hlth/ (Information Ventures, Inc. 2002). Characteristics and properties of herbicides are discussed further in *Chapter 4, Environmental Consequences* and Appendix J. Appendix J also lists typical and maximum label application rates for herbicides.

Types of Herbicides. The following herbicides are specifically addressed in this document.

2,4-D amine is the most commonly used, and most widely studied, herbicide in the U.S. (U.S. Forest Service 2000a). It is labeled for a wide range of uses, and is an active ingredient in many products offered by several manufacturers for home use. Several common brand names containing 2,4-D formulations are Weed-B-Gon, Weedar 64, HiDep, Formula 40, and Solution. 2,4-D acts as a growth-regulating hormone on broad leaf plants, being absorbed by leaves, stems, and roots and accumulating in a plant's growing tips. 2,4-D has very little persistence in the environment (half life of approximately 1 week), although its salts can move through sandy soils. Soil microorganisms degrade 2,4-D in a matter of weeks, which can require the annual application of this herbicide for long-term effectiveness. 2,4-D has low toxicity to aquatic organisms, with several formulations approved for use in water and near water (U.S. Forest Service 2001c). WEEDAR 64, for example, is a 2,4-D product that is registered for use near water. By comparison, 2,4-D is less persistent in the environment than picloram and can be used closer to water than picloram. 2,4-D exhibits good control of knapweed at application rates of 1 to 2 pounds per acre with repeat applications, and moderate control of houndstongue, sulfur cinquefoil, Canada thistle, and St. Johnswort (U.S. Forest Service 2001d). 2,4-D has been implicated in a class of synthetic chemicals called endocrine disrupting compounds (EDC). The EPA has identified 2,4-D for continuing study, but notes that the connection between 2,4-D and endocrine disruption in wildlife and humans is uncertain (U. S. EPA 1997). The herbicide continues to be recommended for use. The impact of EDCs on wildlife and humans is discussed in Chapter 4.

Chlorsulfuron is used to control many broadleaf weeds and some annual grass weeds. It is absorbed by the leaves and roots of the weed and prevents production of an essential amino acid, which inhibits cell division and plant growth. Treatment areas include non-crop sites such as roadsides, rights-of-way (ROWs), and fence rows. A common formulation of this herbicide is the marketed product, Telar. Chlorsulfuron has a half life of 1 to 3 months, and is broken down to smaller compounds by soil microorganisms. Contact of this herbicide with non-target plants may injure or kill plants. However, it is practically nontoxic to most fish, aquatic invertebrates, birds, and mammals because of the very low use rates and dispersion of residues to deeper soil layers with leaching (Information Ventures, Inc. 2002).

Clopyralid is a relatively new and very selective herbicide. It is toxic to some members of only three plant families: the composites (Compositae), the legumes (Fabaceae), and the buckwheats (Polygonaceae). Clopyralid is practically non-toxic to birds and animals, and exhibits low toxicity in aquatic animals (DOW 2003). Clopyralid is marketed under a number of trade names. It is the active ingredient in Transline and one of two active ingredients (the other being 2,4-D) in Curtail. Clopyralid is very effective against knapweeds, hawkweeds, and Canada thistle at application rates of one-quarter to one-half pound per acre (U.S. Forest Service 2001d). Its selectivity makes it an attractive alternative herbicide on sites with non-target species that are sensitive to other herbicides. Clopyralid is more persistent than 2,4-D and dicamba, but less persistent than picloram. It is degraded almost entirely by microbes and is not susceptible to photo or chemical degradation (Tu et al. 2003). Clopyralid does not bind strongly with soil particles. This lack of adsorption means that it can possibly leach into surface and groundwater. Although no extensive off-site movement has been reported, the possibility of groundwater effects must be considered (Tu et al. 2003). Inert ingredients include isopropyl alcohol and polyglycol (Dow 2003).

Adjuvants are recommended as well, although information about the synergistic effects of adjuvants is extremely limited.

Dicamba is the active ingredient in the marketed product Banvel (liquid formulation) and Veteran 10G (bead formulation). Inert ingredients have not been disclosed (MicroFlo 1999). It is a broadleaf herbicide that is readily absorbed by leaves and roots and is concentrated in the metabolically active parts of the plants. Dicamba is effective against a similar range of weed species applied at similar rates as 2,4-D. However, dicamba is somewhat more persistent in the environment than 2,4-D and, therefore, provides somewhat longer control of susceptible weed species. Dicamba is slightly toxic to fish and amphibians and is practically non-toxic to aquatic invertebrates. Dicamba does not accumulate or build up in aquatic animals. Dicamba is moderately persistent in soils and slightly soluble in water (U.S. Forest Service 1995b). Despite its low toxicity, dicamba is not recommended for direct application to water (MicroFlo 2003).

Fosamine is intended for use on trees and bushes and acts by inhibiting cell division. It has an average half life of 8 days, is moderately mobile in soil, and is stable in water. The primary degradation mechanism is by soil microorganisms. It is slightly toxic to some species of mammals and birds and has a low toxicity to some species of fish. A common formulation of this herbicide is the marketed product, Krenite. This compound will not be used until a risk assessment has been completed and Fosamine is included on the Forest Service list of approved chemicals.

Glyphosate is labeled for a wide variety of uses, including home use, and is marketed as Rodeo, Acçord, and Roundup. (Rodeo is proposed as the main glyphosate compound for use on the S-CNF, mainly for its low toxicity to aquatic systems). Glyphosate is a non-selective, broad-spectrum herbicide that is readily absorbed by leaves, translocated throughout the plant, and disrupts the photosynthetic process. This herbicide affects a wide variety of plants, including grasses and many broadleafs, and has the potential to eliminate desirable as well as undesirable vegetation. Some plant selectivity can be achieved by using a wick applicator to directly apply glyphosate to the target plant, thereby avoiding desirable vegetation. Glyphosate exhibits slight soil movement, and its absorption by roots is minimal to non-existent. Glyphosate readily binds to organic matter in soil and is easily broken down by microorganisms. This herbicide is especially appropriate for use where low soil mobility and short-term persistence are required to alleviate environmental concerns. The Rodeo and Accord formulations of this herbicide (without the surfactant in Roundup) are labeled for use adjacent to water (U.S. Forest Service 1999a; 2001d). Applied at the label direction rates, glyphosate would not adversely affect fish, aquatic macrophytes, or aquatic invertebrates. Inert ingredients for the Rodeo formulation have not been disclosed (DOW 2000). However, none of the adjuvants proposed for use on the S-CNF will have increased toxic effects when combined with Rodeo. There is no evidence that glyphosate is carcinogenic to humans.

Imazapic is a selective herbicide that would potentially be used in a limited number of situations. It can be applied during the fall at a rate of 8 to 12 ounces per acre to control leafy spurge and cheatgrass. Imazapic's half life is 7 to 150 days, depending on soil type and climate conditions (U.S. Forest Service 2001c). Imazapic is marketed under various labels such as Plateau.

Metsulfuron methyl is used to control annual and perennial broadleaf weeds. Typical control areas include ROWs along roadsides and powerline corridors. The most commonly used formulation of this herbicide is the marketed product, Escort. Metsulfuron methyl can be mixed with other chemicals to provide more effective weed control. This herbicide is broken down in the soil by the action of microorganisms and by the chemical action of water.

Picloram is a restricted use pesticide (can only be used by certified applicators) labeled for non-cropland forestry, rangeland, ROWs, and roadside weed control. It is the active ingredient in the marketed product Tordon. Picloram acts as a growth regulator and is used to control a variety of broadleaf weed species. It is absorbed through leaves and root uptake, is easily translocated through plants, and accumulates in new growth causing leaves to cup and curl. Picloram is generally applied at rates of one-quarter to one-half pound per acre for non-rhizomatous weeds (U.S. Forest Service 2001d). Picloram is water soluble, mobile in sandy soils low in organic matter, and may affect desirable plants that have roots growing in treated areas. Degradation by soil microorganisms is slow, and primary breakdown is by ultraviolet light. Picloram is relatively persistent (effectively controlling many weed species up to 3 years after application), although its persistence varies with soil type and weather. Picloram's mobility and persistence have generated concerns over possible groundwater contamination or runoff to surface water. Because of this concern, no more than one application of picloram in a treatment area will occur in a year. In addition, picloram is unsuitable for use on areas with shallow water tables and is restricted from use near surface water or groundwater (U.S. Forest Service 1999a). Although picloram is currently being scrutinized as an EDC, no adverse effects on endocrine activity have resulted from numerous studies conducted on mammals and birds to determine picloram toxicity values. The evidence indicates that the endocrine system in birds and mammals is not affected by exposure to picloram at expected environmental concentrations (DOW 2001).

Scythe is a non-selective, broad spectrum, foliar contact herbicide. Pelargonic acid is the active ingredient. This acid is a naturally occurring fatty acid that removes or "burns" the waxy cuticle of both annual and perennial broadleaf and grassy weeds. Scythe will only control actively growing, emerged vegetation and will "burn" only those plants coated with the spray solution. The longevity of control is less when the plants are inactive or mature. Scythe does not translocate or have residual activity in the soil, and it does not persist in the environment. This herbicide would be appropriate for use on infestations under desirable trees and shrubs. Precautions include avoiding open water, applicator safety, and impacts on actively growing, non-target vegetation (U.S. Forest Service 1999a). This compound will not be used until a risk assessment has been completed and Scythe is included on the Forest Service list of approved chemicals.

Sulfometuron methyl is used to control annual and perennial grasses and broadleaf weeds. It is absorbed by the leaves and roots of the weed and stops plant growth by inhibiting cell division. It is an effective pre-emergent herbicide due to its active root absorption. Typical treatment areas include non-croplands such as ROWs, fence rows, and along roadsides. A common formulation of this herbicide is the marketed product, Oust. Sulfometuron methyl has a half life of 1 to 3 days in bright light and approximately 1 month in soil. It is practically insoluble in water and should not be applied to any body of water or wetlands. In Oust,

sulfometuron methyl is formulated as dispersible granules that are easily suspended in water for application (Information Ventures, Inc. 2002).

Triclopyr is a selective herbicide used in various situations, such as controlling weeds or vegetation in road, powerline, railroad, and pipeline ROWs. It is the active ingredient in Garlon 4, and is effective in controlling brush when used in combination with foliar, basal bark, and cut-stump treatments. Triclopyr is often mixed with other chemicals at varying rates to improve effectiveness and reduce the amount of herbicide applied. Triclopyr degrades rapidly in soil and water (U.S. Forest Service 2001d).

WOW (With Out Weeds) is a pre-emergent, non-selective product for use in controlling various grasses and broadleafs in a garden setting. Its active ingredient is corn meal. WOW controls plants at the time of germination; weeds that have germinated will not be killed. WOW is a non-hazardous, organic material intended for use as a pre-emergent garden product. Its possible applications on the S-CNF are probably limited to very localized infestations of weeds near desirable trees or shrubs or within campsites following the treatment of mature plants by other control methods (U.S. Forest Service 1999a). This compound will not be used until a risk assessment has been completed and WOW is included on the Forest Service list of approved chemicals.

Combinations of herbicides may be the most appropriate treatment where several species of noxious weeds occur together, or where the herbicides affect weeds differently. For example, a mixture of picloram and 2,4-D, which are both broadleaf-selective herbicides, is used for many broadleaf weed species. 2,4-D generally has a shorter half-life compared to the more persistent picloram, and when used with picloram may provide more effective weed control than either chemical used alone. By itself, picloram is generally the most persistent of the herbicides described above and therefore requires fewer repeat applications, is more effective against many weed species, and when applied according to label specifications is not likely to affect non-target plants. By comparison, glyphosate (via wick application only) or 2,4-D labeled for use near water might be the only or most appropriate chemicals allowed in the treatment of common tansy, which occurs largely in moist habitats or near water. In contrast, picloram may be used more often to treat yellow starthistle, which occurs in dry sites. Chemical treatment also can be used in conjunction with, or preceding, non-chemical weed control treatments, depending on weed species composition, infestation level, and environmental setting.

Inert Ingredients and Adjuvants. Herbicide manufacturers add inert ingredients (or "other ingredients") to enhance the action of the active ingredient. Inert ingredients may include carriers, surfactants, spray adjuvants, preservatives, dyes, and anti-foaming agents among other chemicals. An inert ingredient is simply any ingredient in the product that is not intended to affect a target plant. The designation as "inert" does not mean an additive is chemically inactive, and it does not convey any information about the toxicity of the ingredient (Tu et al. 2003; EPA 2003). Because many manufacturers consider inerts in their herbicide formulations to be proprietary, they do not list specific chemicals. Listed inert ingredients for the herbicide formulations being considered for use on the S-CNF include water, ethanol, isopropanol, isopropanolamine, kerosene, polyglycol 26-2, and polyoxyethylamine (U. S. Forest Service 1992b; 2001b; NMFS 2002). None of these chemicals are listed as Level 1 (*Inert Ingredients of Toxicological Concern)* or Level 2 (*Potentially Toxic Inert Ingredients)* compounds (EPA 2003). While there is some concern regarding the toxicity

of polyoxyethylamine (POEA), a surfactant included in a formulation of glyphosate, there is no anticipated increase in toxicity of the glyphosate formulation as a result of POEA (SERA 2003).

Adjuvants are solution additives that are mixed with a herbicide solution to improve performance of the spray mixture. Adjuvants can either enhance activity of a herbicide's active ingredient or offset any problems associated with spray application, such as adverse water quality or wind. Adjuvants include surfactants, anti-foaming agents, crop oil or crop oil concentrates, drift retardants, compatibility agents, and pH buffers. Spray adjuvants used on the S-CNF include Activator 90, Spread 90, L1700, Sylatac, R11, and MSO. Activator 90, Spread 90, and L1700 are non-ionic surfactants, meaning they have no ionic charge and are hydrophilic (water-loving). They are generally biodegradable and are compatible with many fertilizer solutions. R11 is a spreading agent that lowers the surface tension on the droplet so it covers the target plant more efficiently. MSO is a methylated seed oil adjuvant that increases the penetration of oil-soluble herbicides into a plant. It is particularly effective during drought, when leaf cuticles are thick (Tu et al. 2003). Both the herbicide and the adjuvant labels include instructions on the use of additives such as these for proper herbicide application. These additives are not hazardous or listed as Level 1 or Level 2 compounds when used as intended and label directions are followed.

Dyes used in conjunction with herbicide applications on the S-CNF include Bullseye, Insight, and Hilight. These dyes provide a bright blue color and are non-hazardous. The presence of a dye makes it far easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dyes make it easier to detect missed spots and to avoid spraying a plant or area twice (Tu et al. 2003).

Carriers are used to dilute or suspend herbicides during application and allow for proper placement of the herbicide, whether it be to the soil or on foliage. Water is by far the most widely used carrier on the S-CNF because it is available, cheap, and the herbicides used by the S-CNF are formulated to be effectively applied with water.

Inert ingredients are not regulated by any federal agency. The Food Quality Protection Act (FQPA) of 1996 eliminates the "inert" classification, and requires EPA to review the effects of "inert" ingredients and other additives. As of early 2003, little has been done to begin testing pesticide additives and their combinations (Tu et al. 2003). However, BMPs, SOPs, and other mitigating application techniques can help prevent significant adverse environmental impacts (Tu et al. 2003).

Application of Herbicides. Herbicides would be applied according to EPA product label requirements and in accordance with directions specified in Forest Service Handbooks 2109 and 6709. All herbicide applications would be performed by, or directly supervised by, a State-certified applicator. The two types of herbicide application—ground-based and aerial—are described in the following text.

Ground-based herbicide application would occur in smaller, fragmented patches of weeds (as compared to aerial applications, described below) and along trails and roads where chemical treatment may be the most effective means of controlling or eradicating noxious and invasive non-native weeds. Those herbicides described in the previous discussion and the same criteria for selecting which herbicides to use would apply to the ground-based

application of herbicides. Methods of application would include broadcast ("block") spraying or spot spraying with backpack pumps, spraying from a pumper unit on the back of a pickup truck or an all terrain vehicle (ATV), or using pack animals in the transport and application of herbicides in more rugged terrain. Ground-based herbicide application would only occur when wind speed is less than 10 miles per hour (mph). All herbicides would be applied according to label instructions and specifications or Forest Service policy, whichever is more restrictive. Precautionary measures associated with the ground-based application of herbicides are described in detail in this chapter in *Section 2.D.3, Management Practices and Mitigation Measures*.

Aerial herbicide application can be an effective means of controlling or eradicating very large infestations of weeds, particularly in areas that have steep slopes, rocky soils, and are difficult or lack access to effectively treat from the ground. Aerial application provides a means to effectively treat large (or small) infestations in isolated areas rapidly and efficiently, dramatically reducing the threat of further establishment or expansion. Aerial herbicide application by helicopter and/or plane could potentially occur throughout the S-CNF excluding the FCRONRW. Herbicides that would be considered for application include those chemicals currently being used in ground-based herbicide applications on the S-CNF and/or other EPA-registered and approved chemicals, as appropriate, for weed control. The herbicide(s) selected for a particular aerial treatment would depend on the same factors as described above. Aerial application would only occur when wind speed is less than 6 mph and blowing away from sensitive resources. Also, as noted above, all aerial herbicide applications would be in accordance with label instructions and specifications or Forest Service policy, whichever is more restrictive. Mitigation measures plus additional precautionary measures associated with the aerial application of herbicides are described in detail in this chapter in *Section 2.D.3, Management Practices and Mitigation Measures*.

All aviation activities would be in accordance with FSM 5700 (Aviation Management), FSM 2150 (Pesticide Use Management and Coordination), FSH 5709.16 (Flight Operations Handbook), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation), and the Salmon-Challis National Forest Aviation Plan. A Project Aviation Safety Plan would be developed prior to aerial spray applications.

e. Combinations of Treatments

This treatment category consists of combining several types of weed treatments using the IWM approach to provide diverse coverage for a site exhibiting a range of conditions, such as differences in species density within a broad area of infestation. This integrated approach also can be used to more effectively treat different life cycles of a single weed species. The intended effect of combining weed treatments into an integrated approach is to collectively increase the stress on a noxious weed species to the point where it dies or loses its competitive advantage and is out-competed by native vegetation. Examples of combinations of treatments include a blend of herbicide and biological controls, herbicide and mechanical controls, mechanical and biological controls, and controlled grazing and mechanical controls (U.S. Forest Service 1999a; 2001d).

2.C.2. Treatment Objectives, Priorities, and Criteria

Treatment of noxious and invasive non-native weeds will be prioritized to guide site-specific implementation so that it has the greatest effect on preventing or minimizing weed impacts on S-CNF resources. Treatment priorities assigned to different weed species are based on the following three considerations:

- A species ability to invade and displace native plant communities (for example, early growth/flowering characteristics, seed productivity, and viability)
- The potential rate of expansion (for example, seed dispersal, viability, and site susceptibility)
- The extent and proximity of susceptible native plant communities (for example, species' and communities' susceptibility to weed invasion)

Treatment objectives, priorities, and criteria for implementing weed treatments on the S-CNF are described in the following seven categories, with priority 1 the highest and priority 6 the lowest. This treatment prioritization, together with knowledge of which treatment method is most effective in achieving a treatment objective and not impacting other forest resources, will guide the site-specific implementation of weed control programs on the S-CNF. Restoration and monitoring activities associated with the treatment priorities are described in this chapter in *Section 2.C.3, Restoration and Monitoring*. The level of Forest Service funding and availability of S-CNF staff and other resources necessary for implementing weed control methods will ultimately determine the schedule for addressing treatment priority categories on the S-CNF.

Priority 1—Eradicate New Populations of Aggressive Weeds. This category has the highest treatment priority. Its objective is to eradicate new populations of aggressive weeds, including all viable seeds and vegetative propagules. Aggressive weeds are those species that can rapidly expand into native habitats and/or displace native vegetation throughout suitable sites on the S-CNF in a relatively short period of time. New populations include potential invaders (not found on the S-CNF but occur nearby), new invaders (recently found on the S-CNF), and new starts from established infestations (additional infestations found on the S-CNF). Treatments that result in the eradication of these three types of new populations of aggressive weeds will receive the highest priority. Table 2-1 lists aggressive weed species associated with known established, new, and potential weed populations that occur on or adjacent to the S-CNF. Established and new weed populations are listed according to S-CNF Ranger District, excluding the FCRONRW. This list is subject to modification based on ongoing weed detection, inventory, and monitoring activities on the S-CNF.

Priority 2—Control Existing Populations of Aggressive Weeds. The objective of this category is to reduce, over time, existing populations of aggressive weeds found on the S-CNF. "Control" is defined to collectively include preventing seed production throughout the target area; decreasing the area coverage of the weed over time; and preventing the weed from dominating the area's vegetation, but accepting low levels of the weed if elimination is not feasible.

Priority 3—Contain Existing Populations of Aggressive Weeds. The objective of this category is to hold existing populations of aggressive weeds found on the S-CNF to their current size. "Contain" is defined to collectively include preventing weeds from expanding beyond the perimeter of the infestation; perhaps providing only limited treatment within the infestation; and treating to eradicate or control the weed outside the perimeter of the infestation.

Priority 4—Eradicate New Populations of Less Aggressive Weeds. The objective of this category is to eradicate new populations of less aggressive weeds when detected on the S-CNF. The goals of eradication are the same as for aggressive weeds. Less aggressive weeds are those species that expand into native habitats more slowly and/or are less successful than Priority 1 aggressive weeds in displacing native vegetation. Table 2-1 lists less aggressive weed species associated with known established, new, and potential weed populations that occur or could potentially occur on the S-CNF. Established and new weed populations are listed according to S-CNF Ranger District. This list is subject to modification based on ongoing weed detection, inventory, and monitoring activities on the S-CNF.

Priority 5—Control Existing Populations of Less Aggressive Weeds. The objective of this category is to reduce, over time, existing populations of less aggressive weeds found on the S-CNF. "Control" is defined the same as for aggressive weeds.

Priority 6—Contain Existing Populations of Less Aggressive Weeds. The objective of this category is to hold existing populations of less aggressive weeds found on the S-CNF to their current size. "Contain" is defined the same as for aggressive weeds.

Custodial Action. In the event S-CNF funding and staffing levels are inadequate for the full implementation of the IWM program, specific treatment for a given weed infestation would be deferred until such funds and staff become available. This is defined as a "custodial" action. Under these circumstances, deferred-treatment infestations would be treated after other higher weed priorities have been addressed, assuming necessary S-CNF funds and staff are available.

Table 2-2 lists the treatment objectives and priorities according to the size of weed infestation for all known species of potential invaders and for each species of new and established invaders known to occur on the S-CNF. The size of the infestation reflects whether an infestation is new or established and thus the priority of treatment it will receive. Objectives and priorities are based on the current size (acres) of infestation. When the area of infestation for potential and new invaders exceeds 5 acres, it may be necessary to reclassify management objectives. The weed species list and associated treatment objectives and priorities in Table 2-2 are subject to modification based on ongoing weed detection, inventory, and monitoring activities on the S-CNF.

TABLE 2-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

			Ranger District[4]						
	Aggressiveness[2]	Designation[3]	Challis	Leadore	Lost River	Middle Fork	North Fork	Salmon/ Cobalt	Yankee Fork
Potential Invaders[1]									
Yellow starthistle (*Centaurea solstitalis*)	A	I							
Purple loosestrife (*Lythrum salicaria*)	A	I							
Jointed goatgrass (*Aegilops cylindrica*)	LA	I							
Skeletonleaf bursage (*Ambrosia tomentosa*)	A	I							
Diffuse knapweed (*Centaurea diffusa*)	LA	I							
Meadow knapweed (*Centaurea pratensis*)	LA	I							
Poison hemlock (*Conium maculatum*)	LA	I							
Field bindweed (*Convolvulus arvensis*)	A	I							
Common crupina (*Crupina vulgaris*)	A	I							
Scotch broom (*Cytisus scoparius*)	LA	I							
Toothed spurge (*Euphorbia dentata*)	LA	I							
Meadow hawkweed (*Hieracium pratense*)	A	I							

TABLE 2-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

			Ranger District[4]						
	Aggressiveness[2]	Designation[3]	Challis	Leadore	Lost River	Middle Fork	North Fork	Salmon/ Cobalt	Yankee Fork
Orange hawkweed (*Hieraclum aurantiacum*)	A	I							
Perennial pepperweed (*Lepidium latifolium*)	A	I							
Milium (*Milium vernale*)	LA	I							
Eurasian watermilfoil (*Myriophyllum spicatum*)	LA								
Matgrass (*Nardus stricta*)	LA	I							
Silver nightshade (*Solanum elaeagnifolium*)	LA	I							
Buffalo bur (*Solanum rostratum*)	LA	I							
Perennial sowthistle (*Sonchus arvensis*)	LA	I							
Johnsongrass (*Sorghum halepense*)	LA	I							
Puncturevine (*Tribulus terrestris*)	LA	I							
Syrian bean caper (*Zygophyllum fabago*)	LA	I							

TABLE 2-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

			Ranger District[4]						
	Aggressiveness[2]	Designation[3]	Challis	Leadore	Lost River	Middle Fork	North Fork	Salmon/ Cobalt	Yankee Fork
New Invaders[5]									
Rush skeletonweed (*Chondrilla juncea*)	A	I					X	X	
Dalmation toadflax (*Linaria genistifolia*)	A	I	X				X	X	
Yellow toadflax (*Linaria vulgaris*)	A	I	X		X		X	X	X
Russian knapweed (*Acroptilon repens*)	A	I					X		
Sulfur cinquefoil (*Potentilla recta*)	A	L					X	X	
Hoary alyssum (*Berteroa incana*)	LA	L		#			X	X	
St. Johnswort (*Hypericum perforatum*)	LA						X		
Houndstongue (*Cynoglossum officinale*)	A	L					X	X	
Bur buttercup (*Ranunculus testiculatus*)	LA							X	
Common tansy (*Tanacetum vulare*)	LA						X	X	
Tansy ragwort (*Senecio jacobaea*)	LA	I							X

TABLE 2-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

			Ranger District[4]						
	Aggressiveness[2]	Designation[3]	Challis	Leadore	Lost River	Middle Fork	North Fork	Salmon/ Cobalt	Yankee Fork
Dyers woad (*Isatis tinctoria*)	LA	I		X			X		
Scotch thistle (*Onopordum acanthium*)	LA	I						X	
Field pennycress (*Thlaspi arvense*)	LA							X	
Blue mustard (*Chorispera tenella*)	LA								
Established Invaders[6]									
Spotted knapweed (*Centaurea maculosa*)	A	I	X	X	X	X	X	X	X
Canada thistle (*Cirsium arvense*)	A	I		X	X		X	X	X
Musk thistle (*Carduus nutans*)	LA	I	X	X	X		X	X	
Bull thistle (*Cirsium vulgare*)	LA				X		X	X	
Leafy spurge (*Euphorbia esula*)	A	I	X	X	X		X	X	
Black henbane (*Hyoscyamus niger*)	LA	I		X	X		X	X	
Cheatgrass (*Bromus tectorum*)	LA		Widely distributed in all Ranger Districts						

TABLE 2-1
Common and Scientific Names of Weeds that are Potential, New, and Established Invaders on Ranger Districts of the S-CNF

			Ranger District[4]						
	Aggressiveness[2]	Designation[3]	Challis	Leadore	Lost River	Middle Fork	North Fork	Salmon/ Cobalt	Yankee Fork
Hoary cress (whitetop) (*Cardaria draba*)	LA	I		X	X			X	
Common mullein (*Verbascum thapsus*)	LA		Occurs in isolated, small populations in all Ranger Districts						

[1]Potential invaders are not currently present on the Salmon-Challis National Forest but are present in surrounding counties or states. The potential for their establishment on the S-CNF is high.

[2]A = aggressive weed species with the ability to rapidly displace native vegetation.
LA = less aggressive weed species that usually do not rapidly invade and displace native plant communities or that may invade in some circumstances but that are not likely to aggressively invade the S-CNF.

[3]I = State of Idaho listed as a noxious weed.
L = Lemhi County listed as a noxious weed.

[4]"X" indicates a species is present on the specified Ranger District. "#" indicates a species is believed to be present but has not actually been observed.

[5]New invaders are present on the Salmon-Challis National Forest but are limited in distribution and numbers of locations. The potential for their further expansion on the S-CNF is high to very high.

[6] Established invaders are present in high densities or are widely distributed on the S-CNF. The potential for their further expansion on the S-CNF is very high.

TABLE 2-2
Treatment Objectives and Priorities by Weed Species and Size of Infestation[1]

Weed Species	Size of Infestation			
	<1 Acre	1-5 Acres	>5-25 Acres	>25 Acres[2]
Potential Invaders	Eradicate	Eradicate		
New Invaders				
Rush skeletonweed	Eradicate	Eradicate		
Dalmation toadflax	Eradicate	Eradicate		
Yellow toadflax	Eradicate	Eradicate		
Russian knapweed	Eradicate	Eradicate		
Sulfur cinquefoil	Eradicate	Eradicate		
Hoary alyssum	Eradicate	Eradicate		
St. Johnswort	Eradicate	Eradicate		
Houndstongue	Eradicate	Eradicate		
Bur buttercup	Eradicate	Eradicate		
Common tansy	Eradicate	Eradicate		
Tansy ragwort	Eradicate	Eradicate		
Dyers woad	Eradicate	Eradicate		
Scotch thistle	Eradicate	Eradicate		
Field pennycress	Eradicate	Eradicate		
Blue mustard	Eradicate	Eradicate		
Established Invaders				
Spotted knapweed	Eradicate	Eradicate	Control	Control/Contain
Canada thistle	Eradicate	Eradicate	Control	Contain
Musk thistle	Eradicate	Control	Contain	Contain
Bull thistle	Control	Control	Contain	Contain
Leafy spurge	Eradicate	Eradicate	Control	Contain
Cheatgrass	Eradicate	Eradicate	Contain	Contain
Black henbane	Eradicate	Control	Contain	Contain
Hoary cress (whitetop)	Eradicate	Eradicate	Contain	Contain
Common mullein	Control	Control	Contain	Contain

[1]Reclassification of treatment objectives may be necessary when infestations of potential and new invaders exceed 5 acres.

[2]If S-CNF funding and staffing levels are limited, specific treatment of infestations of established invaders greater than 25 acres will be deferred (custodial action) until after other higher weed treatment priorities have been addressed.

2.C.3. Restoration and Monitoring

Restoring and monitoring a treated area following the application of weed treatments described above are integral components of an IWM program. The extent and rigor with which these components can be implemented depends on the annual funding levels and staff available to the S-CNF. Restoration activities will also depend on the physical and biological characteristics of the treatment area and the degree of disturbance. The S-CNF wants to encourage natural regeneration where possible and would only consider restoration where the degree of disturbance and physical and biological characteristics dictate restoration is necessary. Restoration and monitoring techniques and objectives are described in the following text.

Site restoration consists of restoring treated areas with desired vegetation. Objectives include revegetating sites after weeds have been eradicated, controlled, or contained; preventing future weed infestations or reinfestations; and slowing the expansion of existing adjacent weed infestations. Revegetation with diverse communities that fill all the niches, especially soil niches and barren sites, makes sites more impermeable to future weed infestations, because noxious weeds often invade open sites where there is no competing vegetation. Site restoration techniques have the effect of increasing the competitive advantage of desirable species and decreasing the competitive advantage of undesirable species. An example of this technique includes planting a diverse mix of desired species (native and desired non-native plants or seeds, consistent with S-CNF policy, where it is known that non-native species would not be a problem) at optimum densities to allow them to compete with weeds and not each other. Other examples of site restoration techniques include retaining brush and tree canopy to shade out weeds; seeding grasses and forbs, then cautiously fertilizing sites that have sparse ground cover; and irrigating treated, revegetated sites where appropriate and feasible. In addition to these techniques, controlled grazing could possibly be managed to favor later rather than early successional stages of native vegetation. The above restoration techniques also could potentially be used to prevent or retard the initial invasion of weeds into uninfested areas.

Monitoring activities would comply with FSH 2109.14 Chapter 50 guidelines and include implementation and effectiveness monitoring. Implementation monitoring is performed during treatment and recorded on the pesticide application report to indicate the appropriate treatment application standards and mitigation measures were followed. Treated and restored sites would be monitored for effectiveness through field investigations to determine the following: 1) whether the desired management objectives of eradicating, controlling, or containing aggressive weeds were achieved; 2) whether site restoration techniques have resulted in the re-establishment of native plants; and if not, what follow-up treatments would be necessary to achieve establishment; and 3) whether the native vegetation has adequately responded in non-restored treatment areas to provide for adequate site protection; and, if not, what follow-up restoration treatments are necessary.

Treatment method and date, target species, and monitoring results would be recorded for each treatment site to compile a long-term database on treatment effectiveness under various conditions.

Monitoring the effectiveness of mitigation measures and buffer zones would also be initiated. A monitoring plan would be developed encompassing either the entire S-CNF or

specific to the individual Ranger Districts that describes both the qualitative and quantitative monitoring protocols. Water quality sampling would be incorporated as necessary to monitor the effectiveness of the riparian and stream buffer zones. Upland sites would be selected to monitor the effectiveness of the mitigation measures and buffer zones on sensitive plant populations and impacts to non-target native species.

Monitoring also would be used to gather data on any new or expanding weed infestations, the density and rate of spread, apparent resultant effects on other S-CNF resources, and the appropriate treatment prioritization and treatment method. Data recorded would include weed location, date of discovery, species, condition, and distribution.

2.C.4. Adaptive Strategy

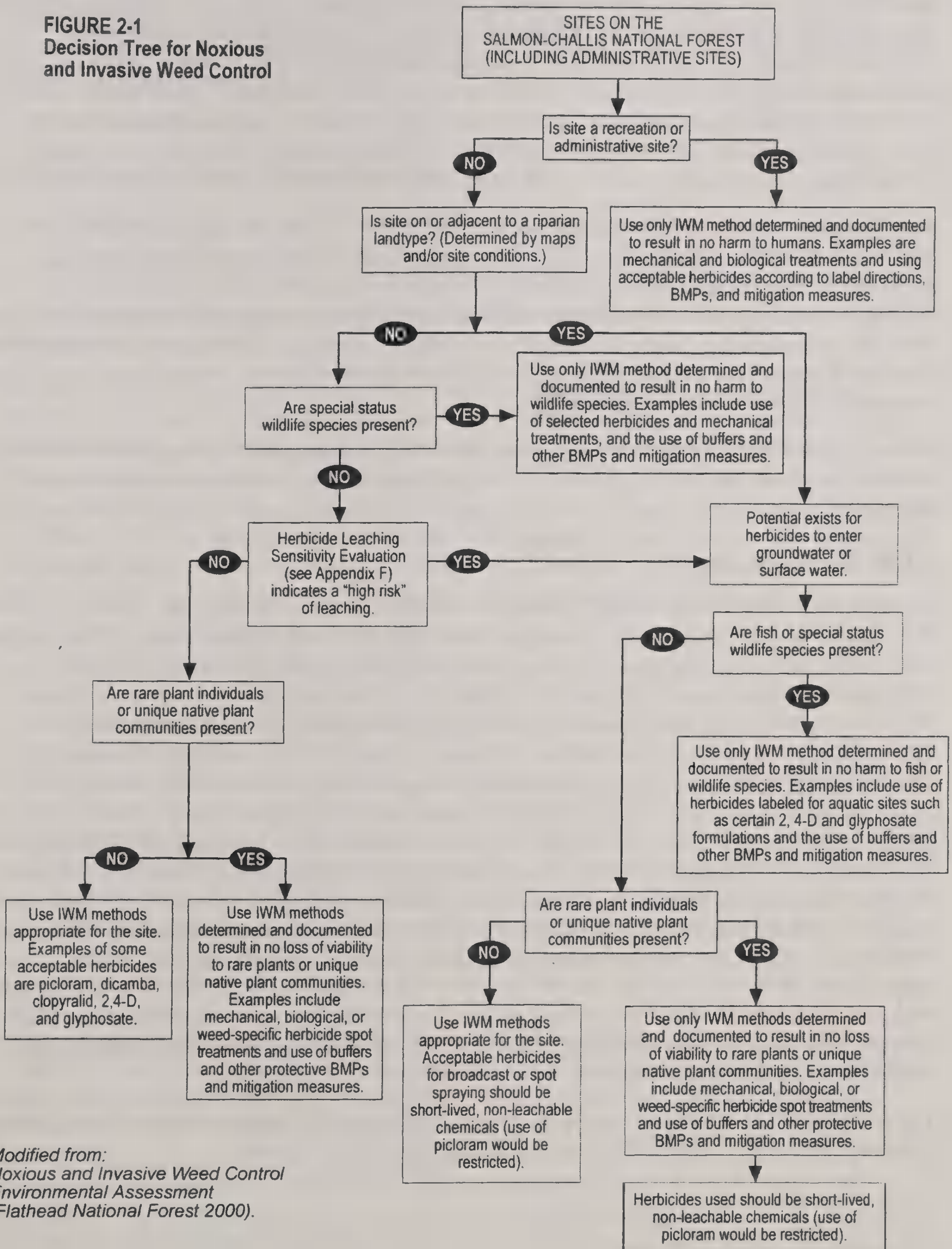
An adaptive weed management strategy would be used to determine appropriate future treatments on the S-CNF if new weed infestations are discovered or existing infestations expand. An adaptive strategy also would be used to treat currently known but uninventoried infestations of weeds. Adaptive strategies would be developed from lessons learned as each site is treated. Additionally, lessons learned by other agencies and CWMAs can also be adapted for new and potential infestations.

The future weed species list for the S-CNF would include any new species not presently identified as occurring, or potentially occurring, on the S-CNF; any new federal-, state-, or county-designated species of noxious weeds; and any non-designated nuisance, non-native weeds that would be considered for treatment on a site-specific basis. Treatment methods would be adapted to the location, species, and priorities described in *Section 2.C.2, Treatment Objectives, Priorities, and Criteria*, and *Section 2.C.6, Site-Specific Implementation Process*, in this chapter. This evolving, site-specific aspect of adaptive management will allow S-CNF managers to learn from past actions, improve effectiveness of future actions, and reduce impacts beyond those known today.

For example, the amount of herbicide applied would be reduced if monitoring indicates effective invasive weed control and less impact on non-target species could be achieved at reduced application rates at other sites. Another example may be that if monitoring reveals undesirable non-target impacts on forbs from spring herbicide applications, herbicides might instead be applied during summer or fall if they are also effective on the target species.

The adaptive strategy process would include determining the weed species present, level of aggressiveness, and infestation size; the proximity to potentially susceptible habitats, sensitive resources, or uses such as recreation, wildlife, aquatic, and special-status vegetation species (see the site-specific decision tree depicted in Figure 2-1); establishing the treatment priority level; and selecting a treatment method based on weed species ecology, likelihood of success, cost-effectiveness, and management objective (eradicate, control/reduce, contain, and custodial). Monitoring, assessing the need for follow-up treatment, and site restoration also would be a part of the adaptive strategy process. In addition, non-treatment practices associated with managing current weed infestations (weed prevention, information/education, cooperative partnerships, inventory and early detection, legal compliance, and mitigation measures), which are discussed further below, would continue under an adaptive strategy.

FIGURE 2-1
Decision Tree for Noxious and Invasive Weed Control



Modified from:
Noxious and Invasive Weed Control Environmental Assessment (Flathead National Forest 2000).

For example, a new infestation of spotted knapweed less than 1 acre in size is discovered. Spotted knapweed is an aggressive weed: Table 2-1 indicates a Priority 1 designation for the species. Table 2-2 directs eradication as the preferred treatment objective. Preferred treatment options for eradication are mechanical and herbicide as noted in Table 2-3. Under adaptive strategy, prior treatments would be reviewed to determine which method most effectively treated the population. Additionally, the herbicide leaching sensitivity evaluation (see Appendix F) and decision tree (see Figure 2-1) are reviewed to identify site-specific limitations and available options based on sensitive resources and physical characteristics.

Another use of the adaptive strategy occurs when new or potential species invade from existing infestations outside the S-CNF. Appendix C describes potential invaders and preferred treatment options. In addition to the review described above, the adaptive strategy would include consultations with other management groups, including CWMAs, to identify and implement the most effective eradication methods. The adaptive strategy mixes treatment lessons learned on the S-CNF with those learned beyond Forest boundaries. Thus, treatment alternatives are maximized.

The scope of this EIS is intentionally broad relative to the issues and geographic scale analyzed in order to provide a basis for the coverage of future weed treatments using an adaptive strategy.

2.C.5. Minimum Tool

The management of noxious and invasive non-native weeds on the S-CNF will incorporate the "minimum tool" approach, where practical. This approach means that S-CNF managers will use the minimum necessary weed treatment method or methods to accomplish management objectives associated with different treatment priorities. For example, some mechanical, biological, and chemical treatment methods may be equally effective in eradicating, controlling, or containing a particular weed species or infestation, depending on treatment objective and priority. In such instances, the method that would least impact S-CNF resources, uses, and values would be used in the minimum tool approach. Treatment method choices are listed in Table 2-3 for species of established, new, and potential invaders according to the size of the infestation, with additional detailed supporting information on treatment choices presented in Appendix C. The effectiveness of a treatment method varies widely, depending on numerous factors. For example, hand-pulling may be effective for some weed species but not for deeply rooted and rhizomatous species or for large infestations. Biological controls are not yet available for many species of non-native weeds and generally are not effective on localized isolated infestations. In a number of situations, the use of herbicides may be the only effective tool for achieving treatment objectives and priorities and in those instances would represent the "minimum tool."

The minimum tool approach would be used on a site-specific basis according to the process described below in *Section 2.C.6, Site-Specific Implementation Process.*

2.C.6. Site-Specific Implementation Process

A number of steps would be followed under the Proposed Action and alternatives to determine and implement the most appropriate treatment method for a site-specific weed infestation. They include the following:

- Detection of the weed
- Prioritization of weed treatment at a particular site
- Determination if sensitive environmental receptors are present
- Determination of the appropriate treatment method for the weed
- Restoring then monitoring the treatment site to determine if follow-up or alternative treatment is warranted

Following detection of a weed or weed population, the primary factors for treatment prioritization would be the information shown in Table 2-2. Treatment prioritization is based on the status of the population (potential, new, or established invaders) and the size of the infestation. Highest priority would be given to stopping potential invaders before they can become established on the S-CNF. New invaders, usually having a small patch size, would have the second highest priority, followed by established invaders. The degree and intensity of treatment recommended in Table 2-2 is based on the importance the S-CNF places on limiting the spread of each weed species and the size of the infestation.

Table 2-2 lists the weed treatment priorities and objectives, but other factors must be considered on a site-specific basis, because more than one treatment method may be available to meet the management objective and sensitive environmental receptors may need protection. Preferred available (but not mandatory) treatment methods for a specific weed are shown in Table 2-3. The four primary site-specific environmental evaluation factors used to select the most appropriate treatment are the presence of water, soil characteristics, presence of sensitive receptors, and plant community parameters. The water factors of interest are whether the site is adjacent to surface water and if the site has a high groundwater table. Soil characteristics of interest are texture and organic matter content. Sensitive receptors include recreation areas, administrative sites, fish populations, and special-status wildlife populations. Plant community factors include the presence of special-status species, presence of unique plant communities, and relative abundance of native vegetation.

After the weed treatment priority and objective have been determined for a specific infestation, the decision tree (Figure 2-1) would be used as a guide to determine the most appropriate treatment method (mechanical, biological, controlled grazing, chemical, or combinations). The herbicide leaching sensitivity evaluation (Appendix F), which evaluates several physical characteristics for leaching potential, would be used in conjunction with the decision tree to aid in this determination. The evaluation of leaching potential is for use on upland sites only. It will be used before all herbicide applications on the S-CNF to evaluate the site conditions influencing the risk of leaching through the soil. Riparian areas would receive special treatment as outlined in the decision tree shown as Figure 2-1.

A special-status plant assessment or field survey would be conducted prior to determining the most appropriate treatment method or in treating a previously untreated weed site. These results would be documented and incorporated into use of the decision tree. The following criteria related to the Endangered Species Act (ESA) would be used to assist in selecting a treatment method:

- If a non-federally listed special-status plant species is located, the treatment method must have "no impact" on the plant or "may impact individuals or habitat, but will not likely contribute to a trend toward federal listing, or cause a loss of viability to the population or species."
- If a federally listed plant is located, all treatment methods would be required to have "no effect" or "may affect but not likely to adversely affect" the plant.

The following are examples of the type of factors used in the decision tree and the leaching sensitivity evaluation to select the appropriate treatment method:

- Presence of sensitive receptors
- Presence of unique plant communities
- Soil texture
- Soil organic matter content
- Distance to groundwater
- Distance to surface water

The appropriate treatment method is indicated at the bottom of the decision tree (see Figure 2-1). This site-specific approach to treating weed infestations embraces the minimum tool concept that was discussed in *Section 2.C.5.* It is designed for present use as well as future use under the adaptive weed management strategy that was discussed in *Section 2.C.4.* This approach also incorporates all of the identified BMPs, mitigation measures, and SOPs, depending on the alternative listed in *Section 2.D.3* and Appendix A.

The site-specific approach is closely related to strategies discussed in *Section 2.C, Integrated Weed Management.* Using the spotted weed example from *Section 2.C.4, Adaptive Strategy,* site-specific information would be used to evaluate treatment methods. If the new spotted knapweed infestation occurred in steep and rocky terrain, for example, information in Table 2-3 and the decision tree would be used to determine if a particular treatment method offered aggressive eradication in terms of the infestation size, weed species, and location but ensured resource protection. For example, if the infestation were small, and near sensitive areas, herbicide spot treatments with short-lived non-leachate chemicals would be the preferred treatment and applied in accordance with all of the identified BMPs, mitigation measures, and SOPs.

2.D. Alternatives Analyzed in Detail

A Proposed Action, two other action alternatives, and a No Action Alternative for the proposed S-CNF Noxious Weed Management Program were analyzed in detail. They are described below and include the following:

- No Action Alternative (No Change from Current Management)

- Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments
- Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)
- Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

The Proposed Action was selected by the S-CNF Weed EIS Content Analysis Team following further review of the six preliminary alternatives presented at the public scoping meetings, evaluation of comments received from the public on alternatives and components of alternatives for the proposed project, and an assessment of which action alternative appeared to best meet the near- and long-term weed management goals for the S-CNF as defined in the project purposes and needs. For each alternative analyzed in detail, vegetative treatments were combined with site restoration activities rather than keeping them as a separate set of weed treatments, because vegetative treatment (in some form) becomes the restoration action.

Alternatives that were considered but eliminated from detailed analysis are described in *Section 2.E, Alternatives Considered but Eliminated from Detailed Analysis,* of this chapter.

2.D.1. Features Common to All Alternatives

a. Non-Treatment Practices

Non-treatment practices are centered around proactive weed prevention and educational programs. As discussed in *Section 1.A.1, Integrated Weed Management,* they are a cornerstone of IWM programs and essential to successfully managing noxious and invasive non-native weeds. A number of non-treatment practices would continue as an integral component of IWM under each of the four alternatives analyzed in detail. These practices include weed prevention; weed inventory and early detection; information and education programs; cooperative partnerships and coordination; and compliance with laws, orders, policies, and Forest Plans. Appendix A provides detailed descriptions of BMPs for weed prevention and management that are followed by Region 4 of the Forest Service and that would continue to be followed on the S-CNF under all of the alternatives analyzed in detail.

2.D.2. Descriptions of Alternatives Analyzed in Detail

The acres and number of sites of inventoried weed infestations that would potentially be treated using various treatment options were estimated using a variety of data sources. The resulting distribution of treatment options that were considered to be potentially the most successful and efficient means for treating all of the inventoried weed infestations on the S-CNF (66,537 acres at 2,724 sites) are listed later in this section in Table 2-5. The distributions of treatment options on the S-CNF are presented later in this section in Table 2-6 assuming an estimated annual treatment rate of approximately 18,000 acres per year for the Proposed Action, Alternative 1, and Alternative 2, and an estimated annual treatment rate of approximately 3,500 acres per year for the No Action Alternative. Table 2-6 provides a comparison of the various treatment options among all the alternatives on an annual basis and provides a basis for analyzing potential impacts. The various data sources

used to compile these tables are described, as follows. Table 2-1 listed known potential, new, and established populations of weed species that occur on or adjacent to the S-CNF. Table 2-2 listed treatment objectives and priorities for these known weed species according to size of infestation and their level of aggression. Appendix B presents detailed information on the number and acres of inventoried weed infestations on the S-CNF by weed species, size of infestation, and location (Ranger District and Hydrologic Unit Codes [HUCs] 4 and 5). Map 2-2 (back of Chapter 2) depicts the locations of 4th and 5th order HUCs and Ranger Districts on the S-CNF and Table 2-4 lists the names of those HUCs. The S-CNF maintains detailed data and Geographic Information System (GIS) files on the species, size, and location of each inventoried noxious weed infestation occurring on and immediately adjacent to the S-CNF. Appendix C presents information on possible treatment methods available for the known potential, new, and established populations of weed species that occur on or adjacent to the S-CNF. Table 2-3 summarizes the preferred available treatment methods from Appendix C according to weed species and size of infestation that could potentially be used to achieve treatment objectives and priorities listed in Table 2-2.

TABLE 2-3
Preferred Available Treatment Methods by Weed Species and Size of Infestation[1, 2, 3]

Weed Species	Infestation <1 Acre	Infestations 1-5 Acres	Infestations 5-25 Acres	Infestations > 25 Acres[4]
Potential Invaders	(See Appendix C for all treatment methods available for eradicating species of potential invaders.)			
New Invaders				
Rush skeletonweed	Mechanical and herbicide	Mechanical or biological		
Dalmatian toadflax	Mechanical and herbicide	Mechanical and herbicide		
Yellow toadflax	Mechanical and herbicide	Mechanical and herbicide		
Russian knapweed	Herbicide	Herbicide		
Sulfur cinquefoil	Mechanical or herbicide	Herbicide		
Hoary alyssum	Mechanical or herbicide	Mechanical or herbicide		
St. Johnswort	Biological, herbicide, or mechanical	Biological, herbicide, or mechanical		
Houndstongue	Mechanical or herbicide	Mechanical or herbicide		
Bur buttercup	Herbicide	Herbicide		
Common tansy	Herbicide	Herbicide		
Tansy ragwort	Herbicide	Herbicide		
Dyer's woad	Herbicide or mechanical	Herbicide or mechanical		

TABLE 2-3
Preferred Available Treatment Methods by Weed Species and Size of Infestation[1, 2, 3]

Weed Species	Infestation <1 Acre	Infestations 1-5 Acres	Infestations 5-25 Acres	Infestations > 25 Acres[4]
Scotch thistle	Mechanical or herbicide	Mechanical, herbicide, or biological		
Field pennycress	Herbicide or mechanical	Herbicide or mechanical		
Blue mustard	Herbicide or mechanical	Herbicide or mechanical		
Established Invaders				
Spotted knapweed	Herbicide or Mechanical	Herbicide	Biological and herbicide	Biological and herbicide
Canada thistle	Herbicide	Herbicide	Biological	Biological
Musk thistle	Herbicide	Biological or mechanical	Biological or mechanical	Biological or mechanical
Bull thistle	Mechanical	Mechanical	Mechanical and biological	Mechanical and biological
Leafy spurge	Grazing and herbicide or mechanical and herbicide	Grazing and herbicide or mechanical and herbicide	Grazing and herbicide; mechanical and herbicide; or biological and herbicide	Grazing and herbicide mechanical and herbicide, or biological and herbicide
Black henbane	Mechanical or herbicide	Herbicide	Herbicide	Herbicide
Cheatgrass	Herbicide or mechanical	Herbicide or mechanical	Herbicide or mechanical	Herbicide or mechanical
Hoary cress (whitetop)	Mechanical and herbicide	Mechanical, grazing, and herbicide	Herbicide, mechanical, or grazing	Herbicide, mechanical, or grazing
Common mullein	Mechanical	Mechanical	Biological	Biological and herbicide

[1]Derived from interpreting the treatment methods described in Appendix C and incorporating the minimum tool concept.

[2]The preferred available treatment methods are not necessarily the most effective treatment nor the required treatment method. Conditions that affect or limit the effectiveness of these treatment methods are described in *Section 2.C.1, Treatment Practices.*

[3]Cultural treatments would be used to restore/revegetate sites following initial mechanical, biological, grazing, and/or herbicide treatments.

[4]If funding and staffing levels are limited, specific treatment of infestations of established invaders greater than 25 acres may be deferred (custodial action) until after other higher weed treatment priorities have been addressed.

For purposes of conducting a "worst-case" analysis in Chapter 4, Environmental Consequences, it was assumed that the treatment method listed in Table 2-3 that could

potentially have the greatest impact on S-CNF resources would be used to treat weed infestations. Those treatments that could also achieve treatment objectives but potentially have less impact on S-CNF resources would represent the minimum tool. The minimum tool (described in *Section 2.C.5*) would be selected during the site-specific implementation process, described in *Section 2.C.6*.

TABLE 2-4
HUC 4 and 5 Watershed Identification Key for the S-CNF

HUC 4: Upper Salmon	
0101	Morgan Creek
0102	Challis Creek
0103	Grandview
0104	Bayhorse
0105	Lower East Fork
0106	Big Lake/Boulder
0107	Upper East Fork
0108	Squaw/Slate
0109	Warm Springs
0110	Casino/Basin
0111	Redfish Lake Creek
0112	Headwaters Salmon
0113	Alturas Lake Creek
0114	Valley Creek
0115	Yankee Fork
HUC 4: Pahsimeroi	
0201	Lower Pahsimeroi
0202	Middle Pahsimeroi
0203	Big Creek
0204	Upper Pahsimeroi
HUC 4: Middle Salmon-Panther	
0301	Colson-Owl
0302	Shoup
0303	Indianola
0304	Deadwater
0305	North Fork
0306	Red Rock
0307	Salmon
0308	Twelve/Lake
0309	Iron Creek
0310	Hat Creek

TABLE 2-4
HUC 4 and 5 Watershed Identification Key for the S-CNF

0311	Lower Panther Creek
0312	Middle Panther
0313	Napias
0314	Deep-Moyer
0315	Upper Panther
HUC 4: Lemhi Basin	
0401	Lower Lemhi
0402	Tendoy
0403	Middle Lemhi
0404	Eighteen Mile
0405	Timber Creek
0406	Hayden
HUC 4: Upper Middle Fork Salmon	
0501	Lower Loon Creek
0502	Warm Springs Creek
0503	Upper Loon Creek
0504	Thomas-Little Loon
0505	Rapid River
0506	Dagger Falls
0507	Marsh Creek
0508	Bear Valley
0509	Elk Creek
0510	Sulphur Creek
0511	Pistol Creek
0512	Indian Creek
0513	Marble Creek
HUC 4: Lower Middle Fork Salmon	
0601	Impassable Canyon
0602	Brush-Wilson
0603	Lower Camas Creek
0604	Yellowjacket
0605	Upper Camas Creek
0610	Cabin-Canyon
0611	Rush Creek
0612	Crooked-Buck
0613	Monumental Creek

TABLE 2-4
HUC 4 and 5 Watershed Identification Key for the S-CNF

0614	Beaver-Gold
0615	Upper Big Creek
HUC 4: Middle Salmon-Chamberlain	
0701	Fall-Johnson
0703	California-Bull
0706	Fivemile-Rhett
0709	Dillinger-Big Squaw
0711	Disappointment-Ltl Squaw
0712	Horse Creek
0713	Corn-Kitchen
0714	Cottonwood Creek
0715	Chamberlain Creek
0716	McCalla Creek
0717	Warren Creek
HUC 4: Little Lost	
1701	Little Lost Sinks
1702	Lower Little Lost
1703	Middle Little Lost
1704	Upper Little Lost
HUC 4: Big Lost	
1801	Dry Channel Big Lost Riv.
1802	Arco
1803	Antelope Creek
1804	Mackay
1805	Willow Creek
1806	East Fork Big Lost River
1807	North Fork Big Lost River

a. No Action Alternative (No Change from Current Management)

Under the proposed S-CNF Noxious Weed Management Program, the No Action Alternative would continue the same weed management programs, treatments, and levels of effort for controlling noxious weeds on the S-CNF as are currently being used. Current weed management is conducted according to the Forest Service's IWM Program, and is authorized by the Findings of No Significant Impact, Decision Notices, and Environmental Assessments for the Challis National Forest (U.S. Forest Service 1989) and Salmon National Forest (U.S. Forest Service 1987b) noxious weed control programs. Weed treatments on the

S-CNF were very limited prior to 1995. Since then, acres of lands treated have generally increased each year from 586 acres in 1995 to 3,371 acres in 2001. Virtually all of these acreages were treated using herbicides. Monitoring has been geared toward program implementation and measuring the effectiveness of treatments on target species. Major IWM activities on the S-CNF that would continue under the No Action Alternative include the following:

- Maintaining noxious weed prevention, education, and public awareness programs
- Treating about 3,000 to 3,500 acres of target noxious weeds each year
- Eradicating new invaders using herbicides and other treatment methods
- Controlling and reducing the spread of established weed infestations
- Coordinating with counties and state agencies to determine priorities and develop uniform treatment strategies

Herbicide applications would continue to be ground-based. Herbicide treatments would continue to include the use of 2,4-D, glyphosate, picloram, and dicamba (U.S. Forest Service 1987b; 1989). All herbicide applications would be in accordance with label instructions and specifications or U.S. Forest Service policy, whichever is more restrictive. The proportion of the acreage treated with a particular chemical, biological, or mechanical method would vary from year to year depending on various factors, such as the species of weed, its aggressiveness, whether it is a new or established invader, and the location and size of the infestation. Mitigating BMPs and SOPs that would be implemented under the No Action Alternative are described in *Section 2.D.3, Management Practices and Mitigation Measures* in this chapter and in Appendix A.

The current noxious weed management program for the S-CNF fulfills the need to develop relationships with local and state agencies and complies with current federal and state law. However, recent watershed analyses show that weed infestations continue to plague the S-CNF. The current level of weed treatment is considerably less than known weed infestations (greater than 66,000 acres) on the S-CNF. New invaders continue to establish populations on the S-CNF, and would likely increase in size unless a more aggressive noxious weed management program than that associated with the No Action Alternative is developed and implemented.

The No Action Alternative does not include a forest-wide action plan to reduce or eliminate the spread of weeds on the S-CNF. It also does not include an adaptive weed management strategy or a minimum tool approach. Site restoration and monitoring activities would be limited in scope. Expanding target species, treatment acres, or choice of chemical would require further NEPA analysis and documentation. This would constrain S-CNF managers from responding in a timely and cost-effective manner to new weed infestations.

b. Proposed Action—Aerial and Ground-Based Herbicide Applications Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments

The management objective of the Proposed Action is to maximize the treatment of noxious weeds throughout the S-CNF as quickly as reasonably possible to protect the forest and its resources. This would be accomplished using the full array of treatment (*Section 2.C.1*) and

non-treatment (*Section 1.A.1 and Section 2.D.1.a*) practices described previously, site restoration and revegetation (where appropriate) and monitoring programs (*Section 2.C.3*), implementing all mitigating BMPs and SOPs described further in this chapter (*Section 2.D.3*) and in Appendix A, employing a site-specific minimum tool approach (*Section 2.C.5*) and site-specific implementation process (*Section 2.C.6*), and following an adaptive strategy (*Section 2.C.4*) in managing future weed infestations. The Proposed Action includes both ground and aerial application of herbicides. A maximum of 15,000 treatment acres per year of herbicides would occur either through ground application or through aerial application. Treatment locations may either be initial (first time) or follow-up treatments in previously treated areas. The distribution of treatment acres between ground application and aerial applications would likely vary on a yearly basis, however, it is expected that ground application would dominate. Aerial herbicide application opportunities will be considered throughout the project area primarily on steep slopes, rocky soils, where access is physically limited, restricted, or hazardous, and where aerial application is the most efficient and cost-effective method. The criteria used to evaluate the proposed aerial application sites include: slopes greater than 50 percent accessibility, proximity to private land (greater than one-half mile) , sites with high weed density (greater than 25 percent cover), and size of infestation (greater than 5 acres). Map 2-3 (back of Chapter 2) depicts weed locations meeting these aerial application evaluation criteria.

Table 2-6 lists the acres of weed infestations on the S-CNF that would potentially be treated annually using the various available treatment options under the Proposed Action. The acre estimates and treatment options presented in Table 2-6 are based on the species of weeds present, their degree of aggressiveness, and the sizes and numbers of their infestations (refer to Table 2-1 and Appendix B); corresponding treatment priorities and objectives aimed at eradicating, controlling, and/or containing weeds (refer to Table 2-2); treatment methods available for various species of weeds (refer to Table 2-3 and Appendix C); and an estimated annual treatment of 18,000 acres of weeds on the S-CNF.

The expected time frames and goals for accomplishing the Proposed Action management objective would vary depending on the extent and severity of weed infestations. As shown in Table 3-1 in Chapter 3, known acres of weed infestations are considerably greater on the North Fork and Salmon-Cobalt Ranger Districts (primarily spotted knapweed infestations) than on the other five Ranger Districts within the S-CNF and may, therefore, require more time to achieve weed management goals. The following management goals are proposed for the S-CNF Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100 percent.
- Reduce established infestations of aggressive weeds greater than 25 acres in size by 50 percent.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.

- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.

- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment for the Proposed Action would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. As stated previously, it is assumed for purposes of this analysis that full funding would be available for implementing the Proposed Action to work toward achieving those goals.

c. Alternative 1—Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Aerial Herbicide Application)

The management objective of Alternative 1 is similar to the Proposed Action, except that it would not include the aerial application of herbicides and is, therefore, less aggressive than the Proposed Action. The approximately 15,000 acres per year that would be chemically treated from both ground and air applications under the Proposed Action would instead be treated under Alternative 1, to the extent possible, using a combination of ground-based herbicide application plus primarily biological treatments. This affects the timeframe and degree of success that would be anticipated on large infestations of weeds in the S-CNF. Except for this difference, all other treatment components and processes described for the Proposed Action would be implemented under Alternative 1. These include the full array of treatment (*Section 2.C.1*) and non-treatment (*Section 1.A.1* and *Section 2.D.1.a*) practices (except for aerial herbicide application), site restoration and revegetation (where appropriate) and monitoring programs (*Section 2.C.3*), implementing all mitigating BMPs and SOPs except those associated with aerial herbicide application (*Section 2.D.3* and Appendix A), employing a site-specific minimum tool approach (*Section 2.C.5*) and site-specific implementation process (*Section 2.C.6*), and following an adaptive strategy (*Section 2.C.4*) in managing future weed infestations.

Table 2-6 lists the acres of weed infestations on the S-CNF that would potentially be treated annually using the various available treatment options under Alternative 1. Weed management goals would be similar to the Proposed Action except for established infestations of aggressive weeds 5 to 25 acres in size and greater than 25 acres in size in all Ranger Districts. Differences in management goals between Alternative 1 and the Proposed Action would be greatest in the North Fork and Salmon/Cobalt Ranger Districts where the largest and continuous blocks of weed infestations suitable for aerial application are located. A combination of biological and ground-based chemical methods rather than aerial herbicide application would be used to treat the numerous large infestations of spotted knapweed. These large weed infestations would be more difficult to access and the treatment less effective, and would require more time to treat compared to aerial herbicide applications. Because of this, the proposed weed management goals under Alternative 1 would be to contain rather than reduce infestations greater than 25 acres on the North Fork and Salmon/Cobalt Ranger Districts, and to reduce infestations greater than 5 acres by a smaller percentage than under the Proposed Action on the Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts. Because of these and other differences

described below and reduced management expectations, the following separate sets of management goals are proposed for the S-CNF Ranger Districts under Alternative 1:

Weed management goals proposed for the Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25-50 percent.
- Reduce established infestations of aggressive weeds greater than 25 acres in size by 25 percent.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

Weed management goals proposed for the North Fork and Salmon-Cobalt Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25-50 percent.
- Contain established infestations of aggressive weeds greater than 25 acres in size.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment for Alternative 1 would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. It is assumed that full funding would be available for implementing Alternative 1 to work toward achieving those goals.

TABLE 2-5

Estimated Acres and Number of Sites of Inventoried Weed Infestations and Possible Treatment Options Considered to be Potentially the Most Successful and Efficient Means for Treating Weeds on the S-CNF[1,2]

	Possible Treatment Options							
	Mechanical	**Biological**	**Chemical**	**Mechanical and Biological**	**Mechanical and Chemical**	**Biological and Chemical**	**Grazing and Chemical**	**TOTAL**
TOTAL								
Acres	1,288	29,999	30,229	336	172	4,278	235	66,537
Sites	385	159	1,484	9	69	366	252	2,724

[1]Excludes the Frank Church River of No Return Wilderness.

[2]Acres based on values contained in Appendix B and rounded to the nearest acre and on information contained in Appendices C and J.

d. Alternative 2—Mechanical, Biological, Controlled Grazing, and Combinations of Treatments (No Herbicide Application)

The objective of Alternative 2 is to increase the level of noxious weed management throughout the S-CNF compared to current conditions using mechanical, biological, controlled grazing, and combinations of these treatments. Except for the exclusion of herbicides, all other treatment components and processes described for the Proposed Action and Alternative 1 would be implemented under Alternative 2. These include a full array of treatment (*Section 2.C.1*) and non-treatment (*Section 1.A.1* and *Section 2.D.1.a*) practices, site restoration and revegetation (where appropriate) and monitoring programs (*Section 2.C.3*), implementing all mitigating BMPs and SOPs except those associated with herbicides (*Section 2.D.3* and Appendix A), employing a site-specific minimum tool approach (*Section 2.C.5*) and site-specific implementation process (*Section 2.C.6*), and following an adaptive strategy (*Section 2.C.4*) in managing future weed infestations.

Herbicides would not be applied under Alternative 2, and they would not be authorized for future use in the adaptive weed management strategy under this alternative. This would limit the choice and in most cases the effectiveness of treatments available for various species and sizes of noxious weed infestations. It would also limit the flexibility to select from a wide range of treatment methods if initial treatments are unsuccessful and re-treatments with a different method are necessary.

Table 2-6 lists the acres of weed infestations on the S-CNF Ranger District that would potentially be treated annually using the various available treatment options under Alternative 2. The expected time frames and goals for accomplishing the management objective would vary depending on the extent and severity of weed infestation—the same as noted for the Proposed Action and Alternative 1. However, it is anticipated that because of fewer treatment methods available for use under Alternative 2 it is not likely that the same level of success would be achieved as for the Proposed Action and Alternative 1. This is especially true for the North Fork and Salmon/Cobalt Ranger Districts where weed infestations are considerably greater than on the other five S-CNF Ranger Districts. In many cases where a reduction in the size of infestation is possible under other alternatives, only controlling or containing the infestation is realistic under Alternative 2, without the use of herbicides. Because of these differences and reduced management expectations, the following separate sets of management goals are proposed for the S-CNF Ranger Districts under Alternative 2:

Weed management goals proposed for the Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 percent.
- Contain established infestations of aggressive weeds greater than 25 acres in size.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Control infestations of less aggressive weeds greater than 5 acres in size.

- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

Weed management goals proposed for the North Fork and Salmon-Cobalt Ranger Districts

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Contain established infestations of aggressive weeds 5 to 25 acres in size.
- Contain established infestations of aggressive weeds greater than 25 acres in size.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Contain infestations of less aggressive weeds greater than 5 acres in size.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment for Alternative 2 would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. It is assumed that full funding would be available to work toward achieving those goals.

TABLE 2-6
Estimated Acres of Weed Infestations to be Treated Annually and Possible Treatment Options on the S-CNF for the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2[1,2,3]

	Possible Treatment Options									
	Mechanical	Biological	Chemical	Mechanical and Chemical	Biological and Chemical	Grazing and Chemical	Mechanical and Biological	Mechanical and Grazing	Biological and Grazing	Total Acres
No Action Alternative	50	550	2,350	50	500	0	0	0	0	3,500
Proposed Action	100	2,600	13,600	100	1,200	100	100	100	100	18,000
Alternative 1	100	2,600	7,000	200	7,600	200	100	100	100	18,000
Alternative 2	2,000	8,000	0	0	0	0	6,000	500	1,500	18,000

[1]Excludes the Frank Church River of No Return Wilderness.
[2]Estimated treatment acres based on values contained in Appendix B and information contained in Appendices C and J.
[3]Estimated treatment acres for the No Action Alternative reflect current and anticipated trends.

2.D.3. Management Practices and Mitigation Measures

BMPs for weed prevention and management that are followed by Region 4 of the Forest Service would continue under the Proposed Action, Alternatives 1 and 2, and the No Action Alternative and are listed in Appendix A. In addition, mitigation measures, BMPs, and SOPs (management practices) specifically associated with all weed treatments, with the ground-based application of herbicides, and with the aerial application of herbicides would be implemented as integral parts of each alternative depending on types of treatments being proposed. Buffer zones are an important part of these mitigation tools during herbicide use, and were developed based on chemical characteristics and designed to minimize the risk of chemical drift or surface movement to non-target species and sensitive resources. These mitigation measures, BMPs, and SOPs are listed in the following text and are intended to avoid, minimize, or offset the potential for adverse impacts on S-CNF resources.

a. Management Practices and Mitigation Measures Common to All Alternatives

1. All invasive weed treatment activities will comply with State and Federal laws and agency manuals, handbooks, and guidelines.
2. Ground disturbances resulting from weed treatment activities will be revegetated with an appropriate, certified noxious-weed-free seed mix or root stock and fertilized, as necessary.
3. Revegetation will be required for any site within the treatment area with substantial soil disturbance or where the native vegetative density is determined to be inadequate for successful site restoration.
4. Native species will be included in revegetation seed mixes. Use of non-native plant materials on National Forest System lands will be considered as necessary to meet site recovery objectives.
5. A full spectrum of plant species including grasses, forbs, and shrubs (as appropriate) will be used on revegetation sites in order to have the greatest potential to hold the site against weed reinfestation and meet site recovery objectives.
6. Clean all equipment before leaving the project site when operating in areas infested with weeds. Equipment coming from outside the S-CNF must be cleaned prior to entering the S-CNF. Vehicles may be inspected to ensure equipment is cleaned.
7. Provisions will be specified (in the permit and/or operating plan) as needed for the prevention and control of weeds when new and existing use permits are issued/reissued.
8. All weeds that are mechanically or hand excavated after bud stage will be bagged and properly disposed.
9. New biological agents will not be released until approved by the USDA APHIS.
10. A site-specific project operation plan will be required prior to initiating a controlled livestock grazing treatment. (Does not apply to the No Action Alternative.)

11. Prehistoric trails, remnants of historic structures, and other heritage resources will be protected from disturbance during treatment activities.

12. A 1/2 mile radius no disturbance zone will be implemented from March through August around known great gray owl, northern goshawk, Cooper's Hawk, sharp-shinned hawk, and bald eagle nesting sites; a 1/8 mile no disturbance zone will be implemented around all other raptor nests.

13. Tribal notification to the resource technical staff of dates, locations, maps, and a summary of potential impacts and hazards will be provided to the Tribes so that appropriate notification to Tribal members can be made.

14. When scheduling treatment activities, consider the seasonal harvesting periods of wildlife, fish, and plants to accommodate the needs of the Tribes.

b. Management Practices and Mitigation Measures Common to the Proposed Action, Alternative 1, and the No Action Alternative

1. All chemicals will be applied in accordance with EPA registration label requirements and restrictions.

2. Herbicide applicators will obtain a weather forecast for the area prior to initiating a spraying project to ensure no extreme precipitation or wind events could occur during or immediately after spraying that could allow runoff or drift into streams.

3. A Pesticide Application Record (PAR) will be completed on a daily basis for each project area detailing the chemical application, treatment area, target species distribution and density, weather conditions, and recommendations for follow-up treatments or rehabilitation.

4. Treatment areas will be identified on maps available at the Ranger District offices and the Public Lands Office in Salmon, Idaho. The herbicides used, dates of use, and name and phone number to contact for more information will also be available.

5. Application of any herbicides to treat noxious weeds will be performed by or directly supervised by a State or Federal licensed applicator.

6. Procedures for mixing, loading, and disposal of herbicides as outlined in Appendix D will be followed.

7. Herbicide applications will be coordinated with permit holders within the project areas, as appropriate.

8. Chemical herbicides will not be applied to open water, unless the label specifically allows such applications.

9. No chemical herbicides will be used within a 100-foot radius of any potable water spring development.

10. Specific label directions, recommendations, and guidelines will be followed to reduce drift potential (i.e., nozzle size and pressure, additives, wind speed).

11. No spraying of any herbicide will occur when wind velocity exceeds 10 mph, as per State of Idaho Department of Agriculture standards.
12. No spraying of any herbicide will occur within 50 feet of open water when wind velocity exceeds 5 mph.
13. A 50-foot no-spray buffer zone will apply for broadcast or 'block' applications and a 15-foot buffer will apply for spot applications along all flowing water streams and ponded water bodies. Reduced buffer zones will be considered when using label-approved aquatic formulations (e.g., aquatic 2,4-D).
14. A 50-foot no-spray buffer zone will apply to all perennial and intermittent streams and areas with water tables less than 6 feet deep when applying picloram (Tordon 22K).
15. No spraying of picloram will occur within 100 feet of surface water when wind velocity exceeds 5 mph.
16. No more than one application of picloram in a treatment area will occur per year.
17. Vehicle-mounted boom sprayers will travel in an upstream direction to dilute over sprays, providing traffic safety is not jeopardized.
18. Dyes (e.g., Insight, Hilite) will be used in riparian areas, and other locations as appropriate, to provide visual evidence of treated vegetation.
19. All herbicides will be handled following Forest Service Handbook (FSH) 6709 and 2109, and Forest Service Manual (FSM) 2150 guidelines.
20. Herbicides applicators will be familiar with and carry a Herbicide Emergency Spill Plan (Appendix D) to reduce the risk and potential severity of an accidental spill. The plan will identify methods to report and clean up spills should they occur. Herbicide applicators will also carry spill-containment equipment.
21. All treatment sites will be evaluated for sensitive plant habitat suitability. If suitable habitat is present and a field survey has not previously been performed, a properly timed field survey will be performed prior to treatment.
22. No chemical will be applied directly on sensitive plants during spot applications and a 100-foot buffer will be employed around known populations of sensitive plants during broadcast (block) applications.
23. Weed-specific herbicides will be used on big game winter range to minimize impacts to winter forage.

c. Management Practices and Mitigation Measures Specific to Aerial Herbicide Application for the Proposed Action

1. All aviation activities will be in accordance with FSM 5700 (Aviation Management), FSM 2150 (Pesticide Use Management and Coordination), FSH 5709.16 (Flight Operations Handbook), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation), and the Salmon-Challis National Forest Aviation Plan. A Project Aviation Safety Plan will be developed prior to aerial spray applications.

2. A checklist will be developed and signed-off to ensure that all treatment practices, mitigation measures, and safety measures are in place before aerial treatment of any project area.

3. Herbicide applicators will obtain a weather forecast for the area prior to initiating an aerial spraying project to ensure no extreme precipitation or wind events could occur during or immediately after spraying that could allow runoff or drift into streams.

4. Aerial herbicide application will not occur during periods of inversion.

5. The agency will coordinate with Idaho Department of Fish and Game (IDFG) when planning aerial spraying of big game winter ranges.

6. Mitigation measures such as timing, type of chemical, mixture, rates, etc., will be used to minimize impacts to winter big game forage from aerial spraying.

7. No aerial spraying will occur within 300 feet of developed campgrounds or residences.

8. Adjacent campgrounds within the project area will be closed during the application period.

9. Adjacent landowners and affected permit holders will be notified in advance of aerial herbicide applications.

10. Contact with potentially affected Indian Tribes will be made to inform them of aerial treatment locations and times.

11. All aerial treatment areas will be assessed or field surveyed for sensitive plants prior to initial spraying. If suitable habitat is present and a field survey has not previously been performed, a properly timed field survey will be performed prior to treatment.

12. Specific label directions, recommendations, and guidelines (i.e., nozzle size and pressure, additives, air speed, aircraft height, boom length, etc.) will be followed to reduce drift potential from aerial herbicide applications.

13. A 300-foot no-treatment buffer zone will be applied to sensitive plant populations.

14. Aircraft smokers, smoke bombs, or other onsite wind monitoring devices will be utilized to determine wind direction and speed.

15. Herbicide application will occur when winds are 6 mph or less and blowing away from sensitive resources.

16. Spray detection cards in buffer zones near sensitive resources (streams, campgrounds) may be utilized to monitor drift.

17. Buffer zones and treatment areas will be delineated (flagged and mapped) and reviewed with the pilot prior to aerial herbicide application.

18. A year-long 1/4-mile-radius "no-fly" zone will be designated to avoid disturbance to active bald eagle and peregrine falcon foraging and nesting sites.

19. A Forest Service Resource Advisor or Contract Officer Representative will be present onsite during aerial herbicide application activities.

20. A 300-foot no-treatment buffer zone will be used on all fish-bearing streams, lakes, and ponds.

21. A 100-foot no-treatment buffer zone will be used on all non-fish-bearing perennial and intermittent streams, lakes, and ponds.

22. No aerial herbcide applications will be allowed within watersheds that supply a municipal water source.

2.E. Alternatives Considered but Eliminated from Detailed Analysis

Several alternatives and components of alternatives for the proposed project were considered but eliminated from detailed analysis. Reasons for their dismissal included not meeting project purposes and needs; not meeting CEQ (NEPA) guidelines of being reasonable, feasible, and viable; not differing substantially from other alternatives being analyzed in detail; being beyond the scope of this EIS; and/or not complying with current laws, regulations, policies, and Forest Plan direction. Alternatives and components of alternatives not analyzed in detail are described in the following text.

The Proactive Prevention Alternative was identified by some publics during public scoping for consideration as an alternative to be analyzed in the Draft EIS. The intent of this alternative is to address and take action on human activities that promote the spread of weeds, specifically, close roads, modify authorized livestock grazing permits, and alter existing timber, mining, and recreational OHV activities. It should be noted, however, that a similar number of responders were opposed to any actions that would limit or curtail existing human uses or activities currently authorized on the Forest.

The purpose of the proposed project is to eradicate, contain, and control the spread and establishment of noxious and invasive non-native weed species. The strategy to accomplish this purpose incorporates IWM concepts utilizing both treatment and non-treatment mechanisms. The impacts to the natural and human environment of the various weed treatment options described in the alternatives are fully analyzed in Chapter 4. Weed prevention is an integral component of the IWM program and is adequately incorporated in the Proposed Action and in each of the alternatives described in *Section 2.D, Alternatives Analyzed in Detail,* of this chapter.

The human uses and activities addressed in this alternative are authorized through the Salmon NF and Challis NF Land and Resource Management Plans. Modification of these authorized uses through an Environmental Impact Statement Record of Decision would amend the two Forest Plans but would necessitate additional public scoping and further NEPA analysis beyond the original intent and scope of weed treatment activities. Addressing human use allocations, analyzing their impacts, and taking action on the numerous human activities that may contribute to the spread of noxious and invasive non-native weed species is more appropriate during Forest Plan Revision where use allocations are specifically identified, scoped, analyzed, assessed, and permitted. Since the original intent and scope of this EIS focused on assessing the impacts of weed treatments and not on

assessing impacts of allocating, authorizing, or permitting human uses across the Forest, the Proactive Prevention Alternative will not be considered further.

The No Treatment Alternative (Discontinue Current Weed Management Program) was Alternative F of the six preliminary alternatives presented at public scoping meetings. This "no management" alternative was considered but eliminated from detailed analysis because it does not meet any of the project purposes and needs, does not comply with the Forest Service's IWM program, is inconsistent with Forest Service policy and plans mandating that noxious weeds and their adverse effects be managed on National Forests, and violates federal and state laws and executive orders. It also would be irresponsible of the Forest Service to ignore weeds on the S-CNF when their presence may impact weed control on adjacent private and public lands.

Another of the six preliminary alternatives also was eliminated from detailed analysis. This alternative was presented to the public during scoping as "Alternative E—Mechanical, Vegetative, Controlled Grazing, Biological, and Combinations of Treatments Followed by Herbicide Application if These Treatments are Unsuccessful." This alternative was eliminated for two primary reasons. First, there was concern that if the non-herbicidal treatments fail and some time passes before this failure is determined, the subsequent weed infestation may have expanded substantially beyond the original acreage, thus further impacting forest resources. The need for increased follow-up herbicide treatments would then have greater potential impacts than the original action. Such an occurrence would not be consistent with meeting project purposes and needs. Second, incorporation of the "minimum tool" approach into the alternatives analyzed in detail should relieve concerns expressed by some of the public of applying chemicals or more chemicals than necessary to achieve treatment objectives. The minimum tool approach means, where practical, using the minimum weed treatment method or methods to accomplish management objectives associated with different weed treatment priorities.

Prescribed burns were considered for possible use as a mechanical treatment technique, but they were not analyzed in detail. It was determined that the potential use and effects of prescribed burns would be too difficult to analyze at a site-specific level and were beyond the scope of this EIS. Using prescribed burns would require further planning development (preparation of a burn plan) and NEPA compliance on the potential effects before this tool could be used on the S-CNF.

2.F. Comparison of Alternatives

Table 2-7 compares and contrasts important features, properties, benefits, and costs of the No Action Alternative, Proposed Action, and Alternatives 1 and 2. Table 2-7 provides summary information for each of these four alternatives on noxious weed management goals, degree to which the eight components of project purpose and need would be met, and components of the IWM Program that would be implemented, including treatment practices, site restoration and monitoring, adaptive strategy, minimum tool approach, and site-specific implementation process. Table 2-7 concludes with a summary of annual total treatment cost, annual average cost per acre treated, and cost versus benefit for each alternative. Table 2-8 provides supporting information and assumptions used to estimate annual costs for each of the treatment options associated with the four alternatives. Table 4-8

in Chapter 4 provides additional comparisons among the four alternatives based on their benefits to, and impacts on, biological, physical, human and socioeconomic, and cultural resources on the S-CNF.

As discussed in *Section 2.D.2, Description of Alternatives Analyzed in Detail* and summarized in Table 2-7, noxious weed management goals are most aggressive and expectations highest for the Proposed Action, intermediate for Alternative 1, and least aggressive and expectations lowest for the No Action Alternative and Alternative 2. This range reflects the full array of treatment practices that would be implemented annually on 18,000 acres of the S-CNF under the Proposed Action compared to fewer treatment methods (either no herbicide or no aerial herbicide application) under each of the other alternatives, as well as fewer acres treated annually under the No Action Alternative (3,500 acres). In addition, management goals are the same for all S-CNF Ranger Districts under the Proposed Action because of the flexibility to aggressively treat weed infestations regardless of species and density, size of infestation, and location (slope, access, and proximity to private land). For Alternatives 1 and 2, weed management goals (and the degree of aggressiveness) for the North Fork and Salmon/Cobalt Ranger Districts are separated from goals for the Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts because of reduced management flexibility resulting from fewer weed treatment options and the presence of large and continuous blocks of weeds on the North Fork and Salmon/Cobalt Ranger Districts.

Table 2-7 lists the eight components of project purpose and need (described in *Section 1.C.3, Project Purpose* and *Section 1.C.4, Project Need)* and the degree to which they would be met by each of the four alternatives. The Proposed Action would be most effective in meeting overall project purpose and need, Alternative 1 would be intermediate in effectiveness, and the No Action Alternative and Alternative 2 would be least effective in meeting overall project purpose and need. (This conclusion is consistent with the discussion of the effectiveness of alternatives in *Section 4.F, Comparison of Alternatives* and comparisons of benefits to, and impacts on, environmental resources presented in Table 4-8 in Chapter 4). The Proposed Action meets all eight components of project purpose and need (Table 2-7). Alternative 1 also meets all eight components, but it meets five of them less effectively than the Proposed Action and only minimally meets one component of project purpose and need. Both Alternative 2 and the No Action Alternative are less effective in meeting all eight components of project purpose and need than either the Proposed Action or Alternative 1, either only minimally meeting or not meeting purpose and need components (Table 2-7).

As noted in the previous discussion of weed management goals, treatment practices implemented through the IWM Program would be most aggressive under the Proposed Action, intermediate under Alternative 1, and least aggressive under the No Action Alternative and Alternative 2 (Table 2-7). Other IWM components, including site restoration and monitoring, adaptive strategy, minimum tool approach, and site-specific implementation process, would be implemented with equal rigor under the Proposed Action, Alternative 1, and Alternative 2. These same IWM components would either be limited in scope or not implemented under the No Action Alternative (Table 2-7).

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Management Goals See Section 2.D.2.	• Maintain noxious weed prevention, education, and public awareness programs • Treat about 3,000 to 3,500 acres annually • Eradicate new invaders using approved herbicides and other treatment methods • Control and reduce spread of established weed infestations • Coordinate with counties and state agencies to determine priorities and develop uniform treatment strategies	The management objective is to maximize treatment of noxious weeds throughout the S-CNF as quickly as reasonably possible through a full array of treatment and non-treatment practices. The Proposed Action would treat about 18,000 acres of weeds each year and employ the following management goals: For all S-CNF Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100% • Reduce established infestations of aggressive weeds >25 acres in size by 50% • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	Essentially the same as the Proposed Action, except this alternative does not include the aerial application of herbicides and is, therefore, less aggressive. About 18,000 acres of weeds would be treated each year. Different, lowered expectations for this alternative require different goals, depending on the conditions in the Ranger Districts: For Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Reduce established infestations of aggressive weeds >25 acres in size by 25% • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	This alternative limits the kind of treatment methods available (no herbicides), and the success of these methods would be limited. About 18,000 acres of weeds would be treated each year. Different, lowered expectations for this alternative require different goals, depending on the conditions in the Ranger Districts: For Challis, Leadore, Lost River, Middle Fork, and Yankee Fork Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Contain established infestations of aggressive weeds >25 acres • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Control infestations of less aggressive weeds >5 acres in size • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
			For the North Fork and Salmon-Cobalt Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Reduce established infestations of aggressive weeds 5 to 25 acres in size by 25 to 50% • Contain established infestations of aggressive weeds >25 acres in size • Eradicate all new starts (<5 acres in size) of less aggressive weeds • Reduce infestations of less aggressive weeds >5 acres in size by 50% • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process	For the North Fork and Salmon-Cobalt Ranger Districts: • Eradicate all new starts (<5 acres in size) of aggressive weeds • Contain established infestations of aggressive weeds 5 to 25 acres • Contain established infestations of aggressive weeds >25 acres • Contain all new starts (<5 acres in size) of less aggressive weeds • Contain infestations of less aggressive weeds >5 acres in size • Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure degree of treatment success • Employ minimum tool approach and adaptive strategy using site-specific implementation process
Purpose and Need See Section 1.C. 1. Protect the natural condition and biodiversity of ecosystems and watershed function within the S-CNF by preventing and/or limiting introduction/spread of invasive non-native plant species.	Does not meet purpose and need. Would continue current noxious weed program. This alternative does not have the flexibility of the Proposed Action. The proportion of acreage treated with a particular chemical or method would vary from year to year, but would generally be limited to about 3,500 acres. Weeds in untreated areas would continue to spread.	Meets purpose and need. Uses full array of treatment and non-treatment methods to maximize the treatment of weeds as quickly as reasonably possible. Use of adaptive strategy, the minimum tool approach, and site-by-site implementation process would manage current and future weed populations. With aerial application and other cost-efficient methods available, the cost of treatment can be effectively spread throughout the S-CNF, based on the priorities identified.	Meets purpose and need, but less effectively than the Proposed Action. In the largest infested areas (typically steep and rocky), the most cost-effective mechanical and ground-spraying methods would not be available or limited. However, the need would be somewhat met through more expensive ground applications such as backpack and ATV applications where access and terrain are favorable. In the long term, the purpose and need would not be met or only very minimally met. Inaccessible large infestations could not be effectively treated due to limited mechanical treatment options and ground-based chemical applications.	Does not meet purpose and need. This alternative would not use herbicides; most mechanical methods would be ineffective on the larger infestations occupying the steep and rocky terrain of the North Fork and Salmon-Cobalt Ranger Districts. Choice of treatment methods would be severely limited and in most cases the effectiveness of the treatment would be questionable. Flexibility of treatment would be limited. In the long term, weeds would continue to spread.

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
2. Eliminate new weed invaders before they become established.	Minimally meets purpose and need. Does not include adaptive weed management strategy or the full array of treatment options. S-CNF personnel would be limited in the timeliness and scope of response to new infestations. This is the top treatment priority. In order to meet this purpose and need, resources would be reallocated from other treatment priorities/projects.	Meets purpose and need. Includes full array of treatment and non-treatment methods; allows swift response and follow-up monitoring if new weed invaders become established.	Minimally meets purpose and need. However, without aerial spraying, the largest weed infestations may only be contained or reduced by 25%. This is the top treatment priority. In order to meet this purpose and need, resources would be reallocated from other treatment priorities/projects.	Minimally meets the purpose and need, since eradication of new invaders is the primary goal for all treatment methods. However, the limited availability of alternative treatments and the expected time frame for effective success could result in only control or containment of the new infestation, not eradication.
3. Contain and reduce known and potential weed seed sources throughout the S-CNF.	Does not meet purpose and need. The current level (acres) of treatment is considerably less than known weed infestations, thus having little overall impact on weed seed sources.	Meets purpose and need. Known weed infestations would be eradicated, controlled, or contained.	Meets purpose and need, but not as effectively as the Proposed Action. Most known and potential weed sources would be reduced or contained.	Does not meet purpose and need, particularly if new and existing weed populations must be eradicated first. Given the cost of methods available under this alternative, the entire annual funding would likely be taken by eradication priorities.
4. Prevent or limit the spread of established weeds into areas containing little or no infestation.	Does not meet purpose and need. The No Action Alternative does not include a Forest-wide action plan to reduce or contain known weed sources. S-CNF personnel would be constrained from responding in a timely and cost-efficient manner to new weed infestations.	Meets purpose and need. Currently weed-free areas would be maintained in that condition through monitoring, adaptive strategy, site-specific implementation, and minimum tool approaches.	Meets purpose and need, but not as effectively as the Proposed Action. Most known weed infestations would be monitored, and any spread could be eradicated by use of the available treatment and non-treatment practices.	Does not meet purpose and need. This alternative focuses on containing established infestations. However, in the long term, the available treatment options would be unable to contain weed infestations as the "contained" infestations would continue to grow.
5. Protect sensitive and unique habitats from new and existing weed infestations.	Does not meet purpose and need. The No Action Alternative does not prevent new or existing weed populations from spreading.	Meets purpose and need. This alternative uses non-treatment and a full array of treatment options to aggressively prevent the spread of new and existing weed populations.	Would meet purpose and need where terrain allows effective treatment options. In areas of steep and rocky terrain (also the areas with the largest infestations of aggressive weeds), this purpose and need would not be met in the long term. Weed invasion from inaccessible areas would prevail and probably spread into more sensitive areas.	Does not meet purpose and need. Aggressive noxious weeds would spread throughout sensitive areas that are already at high risk for infestation.

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
6. Develop criteria to prioritize invasive weed species and treatment areas.	Does not meet purpose and need. Prioritizes treatment methods and acres treated according to species of weed, its aggressiveness, whether it is new or established, and the location and size of the infestation. However, a full range of options to implement priorities is not available.	Meets purpose and need. Identifies treatment based on species of weeds present, their degree of aggressiveness, and the sizes and numbers of infestations; corresponding treatment priorities and objectives; treatment methods available; and estimated annual acres for treatment (18,000).	Meets purpose and need, but not as effectively as the Proposed Action. The largest areas of infestations may be treated with less aggressive measures since the typically steep and rocky terrain cannot be treated effectively with the available options. Although species and treatment areas would be identified and prioritized, the infestation may go unchecked while available options are implemented.	Does not meet purpose and need. Although management goals and priorities have been assigned under this alternative, these goals have greatly reduced "control and reduce" goals while increasing "contain" goals. Thus, prioritization and effectiveness are substantially reduced. Costs of eradication (the first priority in all alternatives) would also limit the ability to meet other control priorities.
7. Comply with and implement current Federal and State law regarding the control of noxious and other invasive, non-native weed species.	Does not meet purpose and need. Under this alternative, weed populations would not be contained or eradicated as required by law.	Meets purpose and need.	Meets purpose and need.	Minimally meets purpose and need, but containment is the only realistic goal in many locations under this alternative.
8. Cooperate with county, state, and other Federal agencies, private landowners, and other organizations interested in managing invasive weeds.	Minimally meets purpose and need.	Meets purpose and need. Would provide the most comprehensive weed treatment and communication with non-U.S. Forest Service organizations.	Meets purpose and need using the same methods as the Proposed Action.	Minimally meets purpose and need. The obligations of the S-CNF in cooperative efforts of weed control would be greatly reduced under this alternative.
Treatment Practices See Section 2.C.1.	No action implies no change from current weed management practices. Generally limited by selection of chemicals and mechanical methods, and the realm of treatment and non-treatment methods is limited to existing strategies. Total acres to be treated annually: up to about 3,500.	Most aggressive application of full array of treatment and non-treatment methods, including aerial application of herbicide. Total acres to be treated annually: about 18,000.	Employs full array of treatment and non-treatment methods, except aerial application of herbicide. Total acres to be treated annually: about 18,000.	Employs full array of treatment and non-treatment methods, except herbicide application. Total acres to be treated annually: about 18,000.
Site Restoration and Monitoring See Section 2.C.3.	Limited in scope. Monitor program implementation and measure the effectiveness of treatments on target species.	Implement (where appropriate) site restoration, re-vegetation, and implementation and effectiveness monitoring following treatment to reduce or eliminate the subsequent reinvasion of weeds, measure the degree of treatment success, and validate buffering effectiveness.	Same as the Proposed Action.	Similar to the Proposed Action (excluding buffer validation monitoring).

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Adaptive Strategy See Section 2.C.4.	Not included. Constrains S-CNF managers from responding in a timely and cost-effective manner to new weed infestations and expansion of existing weed infestations.	Implements S-CNF-wide action plan to reduce or eliminate spread of weeds; adaptive weed management strategy for managing future new weed infestations or expansion of existing infestations.	Same as the Proposed Action	Same as the Proposed Action
Minimum Tool Approach and Site-Specific Implementation Process See Sections 2.C.5 and 2.C.6.	Not included	Employ site-specific minimum tool approach for effectively managing future weed infestations with the least impact on S-CNF resources, uses, and values.	Same as Proposed Action.	Same as Proposed Action.
Total Cost per Year See Table 2-8 for detail.	$843,226	$3,017,588	$6,852,750	$16,370,000
Cost Per Acre per Year See Table 2-8 for detail.	$241	$168	$381	$909
Cost vs. Benefit Cost per acre: **Low**: $<200 **Moderate**: $201-300 **High**: >$300 See Table 2-8 for detailed supporting information and assumptions regarding costs per acre for different treatment methods for the Proposed Action and alternatives. Benefit is the overall effectiveness in light of the purpose and need compared to other alternatives:	Total annual cost is considered moderate, since treatment options are limited and the number of acres to be treated is much less than the other alternatives. Average cost per acre for all acres treated is moderate. See Table 2-8 for details on costs. Benefit is considered low. Overall weed treatment effectiveness of the No Action Alternative would be lower than for the Proposed Action or Alternative 1 because of fewer treatment options and fewer acres treated each year, but greater than for Alternative 2 because of more treatment options. See Table 4-8 for details on benefits.	Total annual cost is considered low, depending on treatment combinations and acres treated. Average cost per acre for all acres treated is low. See Table 2-8 for details on costs. Benefit is considered high. Provides the greatest number of weed treatment options and ability to reach large acreages and difficult access areas. Overall weed treatment effectiveness of the Proposed Action would be greater than for Alternatives 1 and 2 and the No Action Alternative because of a full range of treatment options and the number of acres to be treated each year. See Table 4-8 for details on benefits.	Total annual cost is considered high, depending on treatment combinations and acres treated. Average cost per acre for all acres treated is high. Weed treatment options limited by lack of aerial herbicide application. See Table 2-8 for details on costs. Benefit is considered moderate/high. Overall weed treatment effectiveness of Alternative 1 would be less than for the Proposed Action because of fewer treatment options, but greater than for Alternative 2 and the No Action Alternative because of more treatment options and/ or more acres treated each year. See Table 4-8 for details on benefits.	Total annual cost is considered high. Average cost per acre for all acres treated is high. Weed treatment options are limited to mechanical, biological, and grazing methods. Grazing may not be an option for many areas, and some mechanical treatments may be limited in application. See Table 2-8 for details on costs. Benefit is considered low. Overall weed treatment effectiveness of Alternative 2 would be less than for the Proposed Action, Alternative 1, and the No Action Alternative because of fewer effective weed treatment options. See Table 4-8 for details on benefits.

TABLE 2-7
Comparison of Features, Properties, Costs, and Benefits of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2

Items of Comparison	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Low: Does not meet purpose and need. **Moderate**: Meets purpose and need, but not effectively. **High**: Meets purpose and need effectively. See Table 4-8 for a summary of project-related effects and benefits for the Proposed Action and alternatives.				
Cost Effectiveness See Section 4.D.4	Cost effectiveness is considered low to moderate because fewer acres would be treated under this alternative and weed treatment goals would not be met.	Cost effectiveness is considered high because treatment methods could be selected to most efficiently and effectively meet all weed treatment goals.	Cost effectiveness is considered low to moderate because of limited use of the most economic and effective treatment methods and not meeting all weed treatment goals.	Cost effectiveness is considered low because of the use of expensive weed treatment methods with limited effectiveness and not meeting weed treatment goals.

Tables 2-7 and 2-8 provide cost information and Table 2-7 compares cost versus benefit among the four alternatives. Estimated total annual weed treatment costs would be approximately $843,000 for the No Action Alternative (3,500 acres treated annually). For the other three alternatives that would treat 18,000 acres annually, estimated total annual weed treatment costs would be approximately $3,020,000 for the Proposed Action, $6,850,000 for Alternative 1, and $16,370,000 for Alternative 2. Estimated cost per acre treated per year would be lowest under the Proposed Action ($168 per acre per year), intermediate under the No Action Alternative ($241) and Alternative 1 ($381), and highest under Alternative 2 ($909 per acre per year). The comparatively low cost per acre treated for the Proposed Action reflects the predominance and relatively low cost of aerial herbicide application compared to other treatment methods proposed for use under this alternative (Table 2-8). Aerial herbicide application is not proposed for use under any of the other alternatives.

Cost/benefit comparisons among alternatives presented in Table 2-7 show that the Proposed Action would provide the greatest weed treatment benefits at the lowest treatment cost per acre. Conversely, Alternative 2 would provide the fewest weed treatment benefits at the highest treatment cost per acre. Alternative 1 would provide moderate to high weed treatment benefits and the second highest treatment cost per acre. The No Action Alternative would have the second lowest treatment cost per acre but only provide low weed treatment benefits (Table 2-7).

Cost comparison information in Table 2-8 reflects the range of individual treatment options and costs within and among the four alternatives, as well as the variation in estimated annual treatment costs per acre among and within some of the treatment options. Treatment costs per acre per year would be lowest for the aerial and ground-based application of herbicides under the Proposed Action ($46.25 per acre per year), followed by grazing ($60 per acre per year), and then the ground-based application of herbicides under Alternative 1 and the No Action Alternative ($75.25 per acre per year). Treatment costs per acre per year would be highest for mechanical treatment ($1,000 per acre per year) followed by biological treatment ($500 per acre per year). Table 2-8 footnotes show the wide range in mechanical treatment costs per acre, depending on labor intensity (up to $8,500 per acre for hand pulling weeds). For treatment combinations, estimated costs equal the combined cost of the individual treatments since both treatments would be implemented to increase efficiency and effectiveness.

As indicated in Table 2-8 footnotes, the predominance of aerial chemical treatment under the Proposed Action, together with the low cost per acre for this treatment, accounts for the much lower total annual treatment cost for the Proposed Action than Alternatives 1 or 2, and for the lowest overall treatment cost per acre among all alternatives. Conversely, the predominance of mechanical and biological treatments under Alternative 2, together with the high costs per acre for these treatments, accounts for the substantially higher total annual treatment cost for this alternative than the Proposed Action or Alternative 1, and for the highest overall treatment cost per acre among all alternatives.

2.G. Selection of the Preferred Alternative

The Forest Service has selected the Proposed Action as the Preferred Alternative based on the analyses presented in this Final EIS. Among the alternatives evaluated, the Proposed

Action best meets all of the project purposes and needs, contains the most aggressive and flexible treatment practices for achieving noxious weed management goals, and would provide the greatest weed treatment benefits at the lowest cost per acre. The Proposed Action would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources.

2.H. Environmentally Preferred Alternative

The Forest Service has identified Alternative 2 as the Environmentally Preferred Alternative. This recognition is based on its lack of herbicide use and their potential impacts to the environment. However, Alternative 2 is also recognized as being the least effective of the alternatives evaluated in controlling noxious and non-native invasive weeds, thus having the greatest long-term impacts to native plants, wildlife habitat, and ecosystem health. While Alternative 2 is Environmentally Preferred in the short-term, the Proposed Action is expected to result in the greatest environmental benefits over the long-term and was therefore selected as the Preferred Alternative.

TABLE 2-8

Alternatives Annual Cost Comparison

Following are assumptions, calculations, and estimated costs per year of implementing noxious weed management for the various alternatives. Estimated costs do not reflect overhead or inflation. No attempt was made to estimate the costs of failure to control noxious weeds or aggressively quantify the beneficial effect of weed control on biodiversity or commercial activities associated with ecosystem health. Alternatives 1 and 2 assume that mechanical treatment options (except for very limited hand pulling) would not be appropriate for use in areas with rough, steep terrain. See Section 4.D.4 for a detailed discussion of socioeconomics.

	Possible Treatment Options									
	Mechanical	**Biological**	**Chemical**	**Mechanical and Chemical**	**Biological and Chemical**	**Grazing and Chemical**	**Mechanical and Biological**	**Mechanical and Grazing**	**Biological and Grazing**	**Total Acres Treated, Total Cost, and Average Cost per Acre per Year**
No Action Alternative Number of acres treated per year	50	550	2,350	50	500	0	0	0	0	3,500
Total cost treatment option per year	$50,000	$275,000	$176,838	$53,763	$287,625	$0	$0	$0	$0	$843,226
Cost per acre per year	$1,000	$500	$75.25	$1,075.25	$575.25	NA	NA	NA	NA	$241
Proposed Action Number of acres treated per year	100	2,600	13,600	100	1,200	100	100	100	100	18,000
Total cost treatment option per year	$100,000	$1,300,000	$629,000	$10,463	$655,500	$10,625	$150,000	$106,000	$56,000	$3,017,588
Cost per acre per year	$1,000	$500	$46.25	$1,046.25	$546.25	$106.25	$1,500	$1,060	$560	$168
Alternative 1 Number of acres treated per year	100	2,600	7,000	200	7,600	200	100	100	100	18,000
Total cost treatment option per year	$100,000	$1,300,000	$526,750	$215,050	$4,371,900	$27,050	$150,000	$106,000	$56,000	$6,852,750
Cost per acre per year	$1,000	$500	$75.25	$1,075.25	$575.25	$135.25	$1,500	$1,060	$560	$381

TABLE 2-8

Alternatives Annual Cost Comparison

Following are assumptions, calculations, and estimated costs per year of implementing noxious weed management for the various alternatives. Estimated costs do not reflect overhead or inflation. No attempt was made to estimate the costs of failure to control noxious weeds or aggressively quantify the beneficial effect of weed control on biodiversity or commercial activities associated with ecosystem health. Alternatives 1 and 2 assume that mechanical treatment options (except for very limited hand pulling) would not be appropriate for use in areas with rough, steep terrain. See Section 4.D.4 for a detailed discussion of socioeconomics.

	Possible Treatment Options									
	Mechanical	**Biological**	**Chemical**	**Mechanical and Chemical**	**Biological and Chemical**	**Grazing and Chemical**	**Mechanical and Biological**	**Mechanical and Grazing**	**Biological and Grazing**	**Total Acres Treated, Total Cost, and Average Cost per Acre per Year**
Alternative 2 Number of acres treated per year	2,000	8,000	0	0	0	0	6,000	500	1,500	18,000
Total cost treatment option per year	$2,000,000	$4,000,00 0	$0	$0	$0	$0	$9,000,000	$530,000	$840,000	$16,370,000
Cost per acre per year	$1,000	$500	NA	NA	NA	NA	$1,500	$1,060	$560	$909

Total Costs Derived – Average Treatment Cost per Acre

Mechanical Treatment: $1,000.00. Mechanical weed treatment costs vary from approximately $300 per acre for power mowing to $8,500 per acre for hand pulling. For purposes of comparing treatment costs among alternatives, an average mechanical treatment cost of $1,000 per acre is used.

Biological Treatment: $500.00

Chemical Treatment: $46.25 (Proposed Action). The proportion of acres treated chemically under the Proposed Action using different application methods, together with associated costs per acre, are based on the following assumptions: aerial (50 percent, $25 per acre); truck (20 percent, $30 per acre); backpack (15 percent, $125 per acre); and ATV (15 percent, $60 per acre).

Chemical Treatment: $75.25 per acre without aerial spraying (No Action Alternative and Alternative 1). The proportion of acres treated chemically under Alternative 1 and the No Action Alternative using different application methods, together with associated costs per acre, are based on the following assumptions: truck (25 percent, $30 per acre); backpack (35 percent, $125 per acre); and ATV (40 percent, $60 per acre).

Grazing: $60

Combined Mechanical and Chemical Treatments: $1,000 Mechanical + $46.25 ($75.25) Chemical = $1,046.25 (Proposed Action); $1,075.25 (No Action Alternative and Alternative 1)

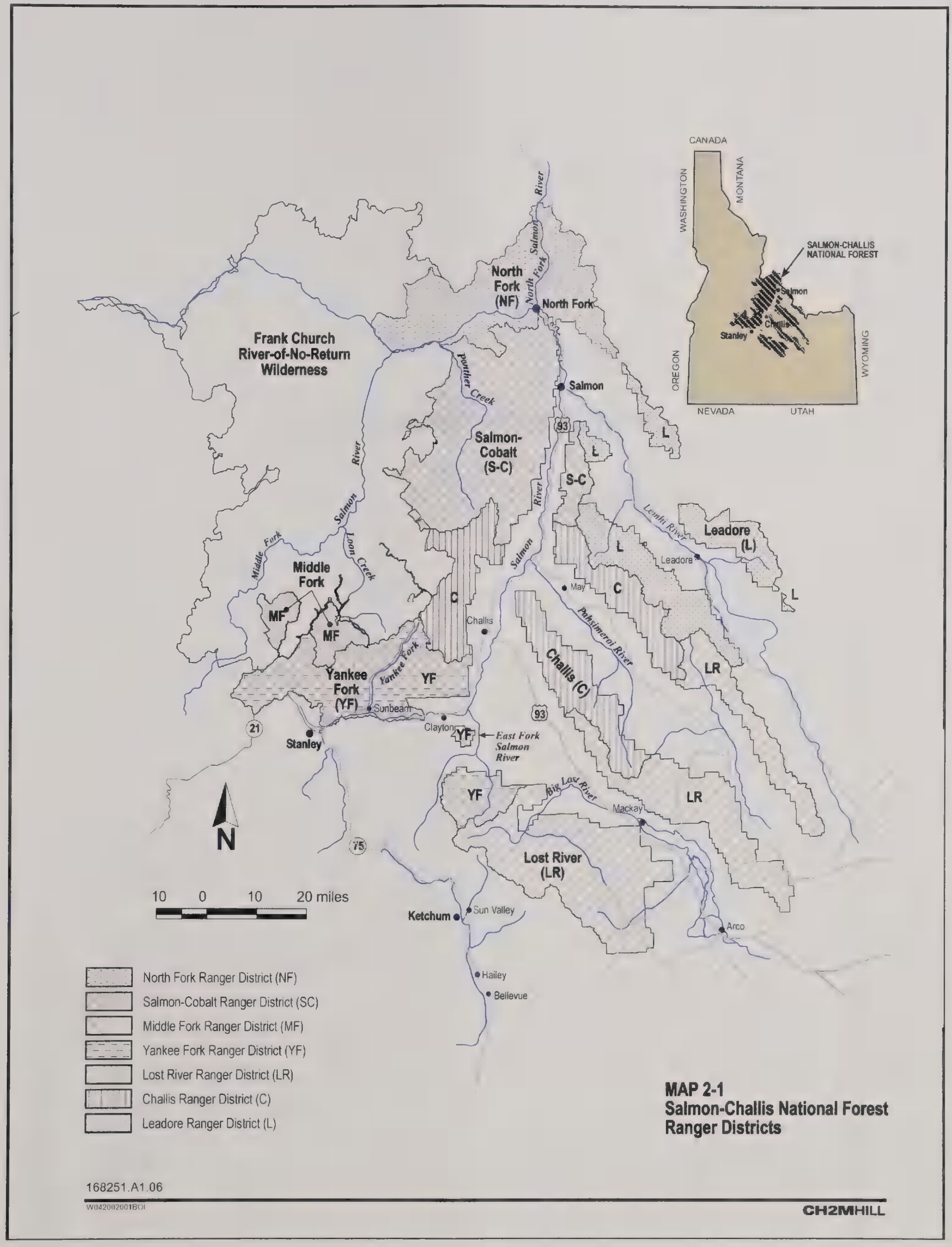
Combined Biological and Chemical Treatments: $500 Biological + $46.25 ($75.25) Chemical = $546.25 (Proposed Action); $575.25 (No Action Alternative and Alternative 1)

Combined Grazing and Chemical Treatments: $60 Grazing + $46.25 ($75.25) Chemical = $106.25 (Proposed Action); $135.25 (Alternative 1)

Combined Mechanical and Biological Treatments: $1,000 Mechanical + $500 Biological = $1,500.00

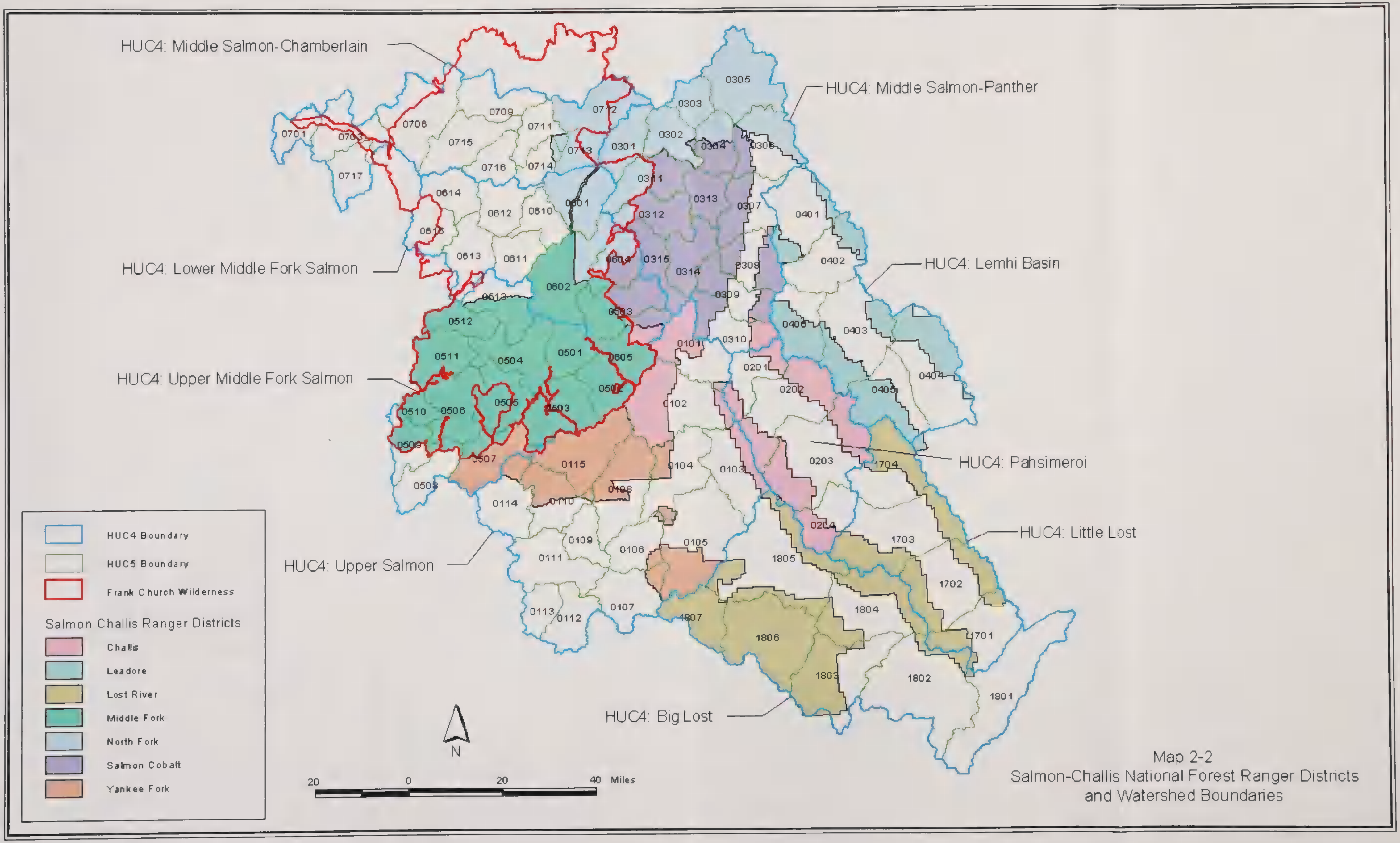
Combined Mechanical and Grazing Treatments: $1000 Mechanical + $60 Grazing = $1,060.00

Combined Biological and Grazing Treatments: $500 Biological + $60 Grazing = $560.00

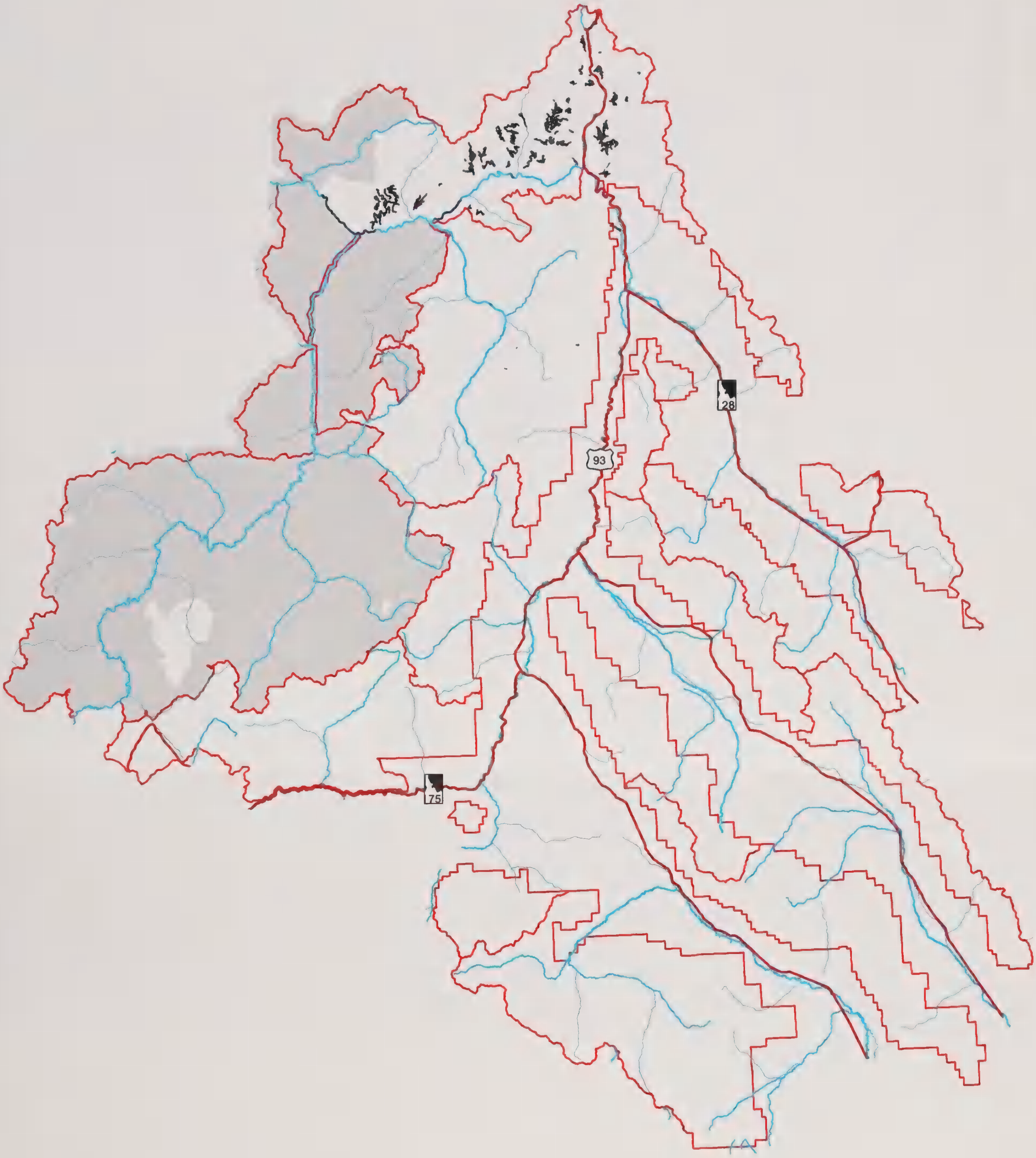


MAP 2-1
Salmon-Challis National Forest Ranger Districts

THIS PAGE LEFT INTENTIONALLY BLANK



Map 2-2
Salmon-Challis National Forest Ranger Districts
and Watershed Boundaries



0 4.5 9 18 27 36
Miles
1:870,000

- District Boundaries
- Wilderness Area

High Slope Weed Areas

- Areas Greater than 5 Acres - Total:16,295 Acres

Map 2-3

Salmon-Challis National Forest Weed Locations Meeting Aerial Evaluation Criteria

Chapter 3. Affected Environment

3.A. Introduction

This chapter describes the current conditions of resources within the S-CNF that could potentially be affected by the Proposed Action, the other two action alternatives (Alternatives 1 and 2), and the No Action Alternative. The following discussions focus on those aspects of the physical, biological, and human environments most likely to be affected by the proposed S-CNF Noxious Weed Management Program, especially by the increased use of herbicides. Resource summaries presented in this chapter are not intended to be comprehensive, encyclopedic catalogues of all conditions on the S-CNF, but rather to focus on characterizing those aspects of the environment potentially at greatest risk from implementing the proposed project. This level of description and the subsequent assessment of environmental consequences in *Chapter 4, Environmental Consequences,* of this Final EIS are consistent with CEQ guidelines for implementing the provisions of NEPA. S-CNF resources that are unlikely to be affected by the proposed project are either not described or are only briefly described in this chapter.

3.B. Project Area Setting

The S-CNF comprises a stunning visual variety of mountain, valley, and shrubland areas. The S-CNF is internationally known for recreational opportunities like whitewater rafting, fishing, and hunting. It includes the traditional homelands of the Lemhi Shoshone Tribe. Lewis and Clark's 1804-1806 expedition traversed the Continental Divide within S-CNF boundaries and the area's rich history includes Idaho's "gold rush." Economically, timber, mining, ranching, and agriculture in the area's bottomlands have maintained the area's viability for more than 100 years. The S-CNF provides diverse habitats for a wide range of wildlife and plant species and for anadromous and resident fish species. Its watersheds provide essential habitat for a number of endangered, threatened, and sensitive species of flora and fauna. Pristine air quality and the adjacent FCRONRW add to the importance of the area.

3.B.1. Climate

The climate of the S-CNF is strongly influenced by oceanic storms from the west, and the drier desert climate to the east. Precipitation comes primarily in the form of winter snows and spring rains, and occasional summer thunderstorms. Winters are generally cold and snowy. Relatively moist spring weather gives way to hot, dry summer and fall conditions with a moderately long growing season at lower elevations and a relatively short growing season at higher elevations. The area's narrow valleys and steep mountainsides result in a widely diverse climate and temperature variations. Annual precipitation ranges from as low as 10 inches in the lower foothills to 25 to 30 inches in the low ridges, to as high as 50 inches in the upper headlands and peaks. Drought has been common (15 percent of the years between 1895 and the present were drought years) in the recorded past (Quigley and

Arbelbide 1997). Consequently, the area is routinely characterized as dry forest, despite some high seasonal moisture.

3.B.2. Geography

The S-CNF is located in Central Idaho, and extends from the eastern borders of the FCRONRW to the Montana border, and south to the volcanic deserts of the Snake River Plain. The Salmon River, a major tributary of the Snake River and ultimately the Columbia River, rises in the southern S-CNF, and much of the upper river is under S-CNF management. Prime population centers include Mackay, Challis, and Salmon. Elevations range from more than 11,300 feet in the Lemhi Range to less than 2,800 feet along the Salmon River. Idaho's highest peak, Mt. Borah, is located in the Lost River Mountain Range of the S-CNF and has an elevation of 12,662 feet.

3.C. Biological Resources

3.C.1. Vegetation Resources and Noxious Weeds

a. Noxious Weeds

1) Species Composition, Abundance, and Extent. Information on the species composition, abundance, and extent of noxious weeds known to occur on the S-CNF was introduced in *Chapter 1, Purpose and Need,* and *Chapter 2, Alternatives,* of this Final EIS. Tables 1-1 and 2-1 list the common and scientific names of the 23 potential, 15 new, and 9 established weed species that presently occur on or may reach the S-CNF in the foreseeable future. Table 2-1 also summarizes, by S-CNF Ranger District, the locations of known established and new weed populations. Appendix B presents detailed information on the number of acres of known weed infestations on the S-CNF by weed species, size of infestation, and location (Ranger District and HUCs 4 and 5). These data reflect the findings of the most recent (2001) inventories. As more inventories are completed, the number of infestations and acres will likely increase.

Table 3-1 summarizes the number of weed species, estimated acres, and number of sites of known weed infestations by Ranger District on the S-CNF, excluding the FCRONRW. Documented, inventoried infestations of the 15 new and nine established weed species on the S-CNF now exceed 66,000 acres at more than 2,500 sites. Most of these infestations vary from less than 1 acre up to 25 acres in size, with extensive populations of spotted knapweed present on the northern part of the S-CNF. Map 3-1 (back of chapter) depicts inventoried noxious weed infestations on the S-CNF. Maps 3-2 through 3-8 (back of chapter) depict inventoried noxious weed infestations within each of the seven S-CNF Ranger Districts.

The North Fork Ranger District contains the greatest number of weed species (16) and acres of weed infestations (54,638) among the seven S-CNF Ranger Districts, followed by the Salmon-Cobalt Ranger District (13 species; 8,182 acres) (Table 3-1). Weed infestations on these two Ranger Districts together comprise approximately 94 percent of all measured noxious weed infestations on the S-CNF. Each of the five other Ranger Districts contains considerably fewer weed species and acres of weed infestations. On the Challis, Leadore, Lost River, and Yankee Fork Ranger Districts, numbers of weed species range from four (Yankee Fork) to eight (Lost River), while acres of weed infestations range from 409 (Yankee

Fork) to 1,627 (Leadore) (Table 3-1). The Middle Fork Ranger District within the S-CNF contains 25 acres of spotted knapweed (Table 3-1).

Table 3-1 also lists the three most abundant weed species (acres of infestations) within each S-CNF Ranger District. They are represented by a total of seven species, and include spotted knapweed, musk thistle, Canada thistle, bull thistle, leafy spurge, yellow toadflax, and sulphur cinquefoil. The three most abundant weed species within each Ranger District dominate that Ranger District's weed communities, collectively accounting for approximately 88 percent of all weed infestations on the Lost River Ranger District; 95 percent on the Leadore Ranger District; 99 percent on the Challis, North Fork, Salmon-Cobalt, and Yankee Fork Ranger Districts; and 100 percent on the Middle Fork Ranger District (Table 3-1).

Spotted knapweed is the most abundant weed species on all but the Lost River Ranger District (leafy spurge) and the Yankee Fork Ranger District (Canada thistle). Spotted knapweed infestations on the S-CNF total nearly 64,000 acres and comprise approximately 96 percent of the total weed infestations. Musk thistle and bull thistle are among the three most abundant weed species in several Ranger Districts but are never the most abundant weed species. Yellow toadflax and sulphur cinquefoil are among the three most abundant weed species in single Ranger Districts, but they cover small acreages compared to the other dominant weed species (Table 3-1).

Table 3-2 lists the species and acres of noxious weeds inventoried just outside the S-CNF boundaries that are associated with the S-CNF Ranger Districts. The presence of these weeds was documented as part of the overall database compilation for the proposed Noxious Weed Management Program on the S-CNF. Gathering near-Forest data such as these contributes to the cooperative weed management programs involving the Forest Service and neighboring counties like Custer County and Lemhi County, and is integral to the overall success of weed management on and near the S-CNF. Map 3-1 depicts weed infestations inventoried just outside the S-CNF that are listed in Table 3-2, as well as inventoried weed infestations on the S-CNF that are listed in Table 3-1. As more inventories are completed, weed acres and distribution will surely increase.

Inventoried weed infestations just outside the S-CNF total 8,934 acres and vary from 5,598 acres of weeds associated with the Leadore Ranger District (see Map 3-1) to 366 acres associated with the Yankee Fork Ranger District (Table 3-2). There were no inventoried off-Forest weed infestations associated with either the Challis or Middle Fork Ranger Districts. Spotted knapweed was the most abundant off-Forest weed species for the five Ranger Districts listed in Table 3-2, except for the Lost River Ranger District where spotted knapweed was second to leafy spurge in abundance. Thirteen other weed species were inventoried just outside S-CNF boundaries, with musk thistle, black henbane, hoary cress (whitetop), Canada thistle, and yellow toadflax among the more abundant species.

2) Weed Ecology, Invasion and Spread, Habitat Criteria, and Site Adaptation. Most habitat criteria for weeds are fairly broad, which is one of the characteristics that makes these species so successful in adapting to new environments. Other general characteristics that often aid in the invasion and spread of weeds are their high reproductive potentials; adaptations to disturbed sites; allelopathic (toxic) compounds that provide weeds a competitive edge by suppressing growth of other vegetation; poisonous compounds, latex

sap, barbs, or prickles that make weeds unpalatable; and/or their lack of natural enemies outside their native country and range.

The Forest Service (2001a, c, d) summarized information on the dynamics of weed invasions (Cousens and Mortimer 1995) and methods of weed spread (Roche and Roche 1991), which is presented in the following text. Weeds generally invade a region (such as the Upper Columbia River Basin) through a three-phase process described by Cousens and Mortimer (1995):

Introduction. Because of dispersal, seeds or plant fragments arrive at a site beyond their previous geographic range and establish populations of adult plants. Potential new invaders on the S-CNF such as yellow starthistle could become a serious problem if allowed to advance beyond the introduction phase.

Colonization. The plants in the founding population reproduce and increase in number to form a self-perpetuating colony. Houndstongue is an example of a new weed species in the colonization phase within the S-CNF.

Naturalization. The species establishes new self-perpetuating populations, undergoes widespread dispersal, and becomes incorporated within the native flora. For example, spotted knapweed in particular, musk thistle, and leafy spurge have been naturalized within many areas of the S-CNF ecosystem. These noxious and invasive weed species displace native species and are not filling a vacated niche on the S-CNF.

Invasion and range expansion by a weed involves all three phases. Typically, plant invasions do not occur along a single front. Instead, new outbreaks initiated by long-distance dispersal become the centers for shorter distance dispersal that eventually fills the gaps between them.

The rate at which weed populations expand can be very difficult to determine, and may be exponential (i.e., a constant proportional rate of increase), or two-phased (with sudden range expansion following a period of little increase in abundance).

It is typically only when the naturalization phase is reached that a weed species is likely to be considered a nuisance. Weed control efforts are then focused on limiting further spread of naturalized weeds into previously uninfested areas. Eradication is usually the goal for species considered to be new invaders at a more local level.

Methods of weed spread include forest roads and trails, which serve as corridors for the dispersal of many weed species. Roche and Roche (1991) discuss the historical perspective of meadow knapweed invasion in the Pacific Northwest and cite many older studies documenting the influence of road systems. Weed seeds and plant parts are moved along road systems by vehicles and people, allowing the establishment of weeds into previously uninfested areas. Many of the road systems within the northern part of the S-CNF contain infestations of species such as spotted knapweed. Road corridors allow weeds to invade areas where ground disturbance has taken place (for example, old timber harvest, gravel pits, etc.). Weeds are also transported by wildlife and domestic stock. Weed seeds consumed by animals or birds or attached to their fur or feathers are carried off road and trail corridors into the forest. Some weed seeds are dispersed by the wind, while others are transported to

new sites by streams and rivers. In this manner, weeds have been able to occupy undisturbed habitats far removed from road or trail systems (Forest Service 2001 a, c, d).

TABLE 3-1
Number of Weed Species, Estimated Acres, and Number of Sites of Inventoried Weed Infestations on Ranger Districts of the S-CNF. The Three Dominant Weed Species (acres) are Listed for Each Ranger District[1,2]

Ranger District/Dominant Weed Species (acres)	Total Weed Species	Total Acres	Total Sites
Challis Ranger District	5	1,122	35
1. Spotted knapweed (625)			
2. Musk thistle (487)			
3. Leafy spurge (5)			
Leadore Ranger District	7	1,627	426
1. Spotted knapweed (959)			
2. Musk thistle (442)			
3. Canada thistle (151)			
Lost River Ranger District	8	534	782
1. Leafy spurge (308)			
2. Canada thistle (91)			
3. Bull thistle (69)			
Middle Fork Ranger District	1	25	8
1. Spotted knapweed (25)			
North Fork Ranger District	16	54,638	568
1. Spotted knapweed (54,568)			
2. Sulphur cinquefoil (21)			
3. Canada thistle (12)			
Salmon-Cobalt Ranger District	13	8,182	856
1. Spotted knapweed (7,539)			
2. Bull thistle (370)			
3. Musk thistle (213)			
Yankee Fork Ranger District	4	409	49
1. Canada thistle (241)			
2. Spotted knapweed (120)			
3. Yellow toadflax (43)			
TOTAL		**66,537**	**2,724**

[1]Excludes the Frank Church River of No Return Wilderness.

[2]Acres based on values contained in Appendix B and rounded to the nearest acre.

TABLE 3-2
Species and Acres of Noxious Weeds Inventoried Just Outside the S-CNF Boundaries that are Associated with the S-CNF Ranger Districts

Ranger District	Species	Acres[1]
Leadore	Spotted knapweed	4,585
	Musk thistle	481
	Black henbane	377
	Hoary cress (whitetop)	62
	Canada thistle	50
	Leafy spurge	42
	Russian knapweed	1
Total Acres Associated with District		**5,598**
Lost River	Leafy spurge	1,262
	Spotted knapweed	215
	Black henbane	147
	Musk thistle	17
	Bull thistle	10
	Canada thistle	5
	Diffuse knapweed	1
Total Acres Associated with District		**1,657**
North Fork	Spotted knapweed	511
	Rush skeletonweed	5
	St. Johnswort	5
	Houndstongue	1
	Leafy spurge	1
	Sulphur cinquefoil	< 1
	Hoary alyssum	Present
Total Acres Associated with District		**523**
Salmon-Cobalt	Spotted knapweed	781
	Musk thistle	4
	Leafy spurge	2
	Common tansy	1
	Houndstongue	1
	Canada thistle	< 1
	Black henbane	< 1
	Hoary cress (whitetop)	< 1
	Hoary alyssum	Present
Total Acres Associated with District		**790**
Yankee Fork	Spotted knapweed	297
	Yellow toadflax	50
	Leafy spurge	12
	Canada thistle	7
	Rush skeletonweed	< 1
Total Acres Associated with District		**366**
GRAND TOTAL		**8,934**

[1]Ranger District totals rounded to nearest acre.

There are many weed species of concern on the S-CNF, either because they are presently established (24 species) within the S-CNF boundaries or because they may potentially become established (23 species) and are listed by the State of Idaho as Noxious Weeds.

Table 3-3 lists those 47 species, together with information on their life cycle, mode of reproduction, and habitat criteria/site adaptation that contribute to their invasion and spread. The following text presents additional information on the seven weed species discussed previously (see Table 3-1) that represent the most abundant weed species on the S-CNF Ranger Districts. These species are of particular concern to the S-CNF because of the numbers of acres they have invaded and the potential for further infestations.

Spotted knapweed. This native of Europe is a biennial or a short- to long-lived perennial that grows 3 to 5 feet tall. It is named for the dark fringe on the flower-head that resembles dark spots. This species has invaded the S-CNF from the north (Montana) and now occupies the most land area in the northern Ranger Districts of the S-CNF. Spotted knapweed occurs across approximately 54,568 acres of the North Fork Ranger District, 7,539 acres of the Salmon-Cobalt Ranger District, 959 acres of the Leadore Ranger District, 625 acres of the Challis Ranger District, 120 acres of the Yankee Fork Ranger District, 25 acres of the Middle Fork Ranger District, and 20 acres of the Lost River Ranger District.

Spotted knapweed is an aggressive competitor and reduces biodiversity by outcompeting and eliminating native vegetation. It reduces livestock and wildlife forage and is detrimental to water and soil resources. Sites infested with spotted knapweed have much higher than normal water runoff (56 percent higher) and stream sediment loads (192 percent higher) than non-infested lands (Lacey et al. 1989). Seeds from this species can germinate on sites with a wide range of conditions, and multiple rosettes on a single spotted knapweed root crown are common (Watson and Renney 1974). This species produces an allelopathic compound (cnicin), but its aggressive resource competition has the most impact in determining competitive success over native species (Kelsey and Locken 1989). Spotted knapweed is capable of invading well-managed rangelands, but its rapid establishment and spread are linked to disturbance factors such as fire, road-building, logging, or heavy grazing.

Seeds germinate in fall and early spring. Thirty percent of seeds may be viable after eight years of burial (Davis 1990). Spotted knapweed appears to be best adapted to well-drained, light-textured soils that receive summer rainfall, including habitats dominated by ponderosa pine, Douglas-fir, and shrub-steppe grassland habitats with bluebunch wheatgrass, needle-and-thread, and Idaho fescue (Chicoine 1984).

Musk thistle. This biennial species reproduces by seed and can grow up to 8 feet tall. It forms a rosette the first year after germination, then bolts and produces seeds the second year. This species occupies approximately 486 acres on the Challis Ranger District, 441 acres on the Leadore Ranger District, 213 acres on the Salmon-Cobalt Ranger District, 14 acres on the Lost River Ranger District, and 1 acre on the North Fork Ranger District.

Musk thistle spreads through seed production, with the first flower-heads producing the most seeds. An average plant can produce 10,000 seeds with 33 percent viability (McCarty 1982). The seeds can survive in the soil for more than 10 years, and it may take as many as 15 years to decrease the germination of buried seeds to 1 percent (Burnside et al. 1981). This species needs sun and adequate soil moisture to germinate. It has allelopathic inhibitors that peak when the plant is bolting and the rosette leaves are decomposing (Wardle et al. 1993). This decomposing thistle tissue in the soil stimulates germinating seedlings. Musk thistle abundance decreases in shade and closing canopies (Medd and Lovett 1978).

Canada thistle. This is an aggressive perennial species from Europe that reproduces through both seed production and extensive, creeping roots. It is adapted to a wide range of habitats, but is best adapted to open areas with moderate to moist moisture conditions (Moore 1975). Canada thistle occurs on approximately 241 acres of the Yankee Fork Ranger District, 151 acres of the Leadore Ranger District, 91 acres of the Lost River Ranger District, 35 acres of the Salmon-Cobalt Ranger District, and 12 acres of the North Fork Ranger District.

New shoots begin to emerge when average air temperatures reach 46°F (Hodgson 1968). A single seedling can rapidly form a large dense patch just through vegetative reproduction of the root system (Donald 1994). Depending on the depth of burial, some seeds can remain viable for up to 22 years (Madsen 1962).

Bull thistle. This biennial is native to Eurasia and usually occurs below 7,545 feet elevation. Like many other weed species, it is adapted to areas with ground-disturbance, such as road construction, mining, heavy livestock use, fires, or logging. For this reason, bull thistle is usually found in heavily grazed pastures, along roadsides and other disturbed areas, at edges of dry meadows, and in logged areas—particularly landings where soil disturbance is heaviest (Randall 1991). Bull thistle occurs on approximately 370 acres of the Salmon-Cobalt Ranger District, 69 acres of the Lost River Ranger District, and 1 acre of the North Fork Ranger District.

Bull thistle is an aggressive weed and can form dense patches, which can spread rapidly. Since this species has a tap-root, it reproduces only by seeds and spreads from the point of origin through seed dispersal (Klinkhamer and DeJong 1993). Cultivation, mowing, or hand-pulling just before flowering can control infestations. Mowing works best late in the season, when most of the plants have bolted, but before significant numbers flower (Randall 1990). Plants will sprout from the stem and flower if mown too early. Cut flower-heads left onsite are still able to develop viable seed.

Leafy spurge. This perennial is extremely difficult to eradicate or even control because it spreads by both seeds and extensive roots, which can exceed 20 feet in depth. This plant produces a poisonous latex. This species occupies approximately 308 acres on the Lost River Ranger District, 55 acres on the Leadore Ranger District, 11 acres on the North Fork Ranger District, 5 acres on the Challis Ranger District, and 2 acres on the Salmon-Cobalt Ranger District. Leafy spurge tolerates a wide range of habitats and may occur on rich, moist sites, such as along streambanks, or on extremely nutrient-poor, dry soils typical of many western rangelands. It is most aggressive in semi-arid situations where competition from associated species is less intense. As a result, infestations generally occur and spread rapidly on dry hillsides, dry prairies, or arid rangelands. Although it occurs on all soils, leafy spurge seems best adapted and spreads fastest on coarse-textured soils (Selleck et al. 1962).

Individual leafy spurge flowering shoots may produce up to 250 seeds. For dense patches, this can result in an annual production of more than 8,000 seeds per square yard (Best et al. 1980). Initial seed dispersal is by the 'explosive' rupturing of the mature capsule that can propel the seeds 5 yards (Best et al. 1980). Vegetative reproduction is the primary means of patch expansion once a plant is established at a site.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
ESTABLISHED INVADERS				
Whitetop (Hoary cress)	*Cardaria draba*	Perennial	Variety of non-shaded, disturbed conditions, including roadsides, waste places, fields, gardens, feed lots, watercourses, open grasslands, and along irrigation ditches. Not particular about soil type, even saline soils, except for highly acidic soils. Most aggressive, rapid expansion occurs in irrigated conditions or during moist years.	Seeds (viable 3 years) and deep creeping roots.
Musk thistle	*Carduus nutans*	Biennial or winter annual	Musk thistle does best after disturbances such as along roadsides, grazed pastures, burned areas, and old fields, but also can invade deferred pastures and native grasslands. It can occur in almost all habitats except dense forests, high mountains, deserts, and frequently cultivated farmlands.	Seeds (prolific seed producer, seeds viable up to 10 years).
Spotted knapweed	*Centaurea maculosa*	Biennial or short- to long-lived perennial	Best adapted to well-drained, light-textured soils in areas that receive some summer rainfall. This includes ponderosa pine and Douglas-fir forests and shrub-steppe habitats with bluebunch wheatgrass (*Agropyron spicatum*), needle-and-thread (*Stipa comata*), and Idaho fescue (*Festuca idahoensis*).	Seeds (viable up to 8 years) and lateral shoots.
Canada thistle	*Cirsium arvense*	Perennial (several ecotypes)	Prefers and is invasive in prairies and other grasslands and riparian areas with deep, well-aerated, mesic soils, but also occurs in almost every upland herbaceous community, especially roadsides, abandoned fields, and pastures.	Seeds, shoots from lateral roots (dormant, buried seeds can remain viable for up to 26 years).
Bull thistle	*Cirsium vulgare*	Biennial	Occurs in dry to moist habitats, fields, pastures, grasslands, roadways, forest clearings, rock outcrops, and along waterways. Does best in areas with moderate slope. It is not shade tolerant.	Seeds (viable for 3 years or less).

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
Leafy spurge	*Euphorbia esula*	Perennial	Occurs on untilled, non-cropland habitats, including both disturbed and undisturbed sites, especially abandoned cropland, pastures, rangelands, woodlands, roadsides, and waste places. Tolerant of a wide range of soils from rich, moist soils of riparian zones to nutrient-poor, dry soils of western rangelands. It is most aggressive in semi-arid situations where competition from associated species is less intense, so invades most rapidly on dry hillsides, dry prairies, or rangelands.	Seeds (viable up to 8 years, usually germinate within 2 years) spreading roots.
Black henbane	*Hyoscyamus niger*	Annual or biennial	Disturbed open sites, roadsides, fields, waste places, and abandoned gardens. Grows best in sandy or well-drained loam soils with moderate fertility. Does not tolerate waterlogged soils.	Seeds (seeds viable for 4 years).
Common mullein	*Verbascum thapsus*	Biennial or short-lived perennial	Natural meadows and forest openings, where it adapts easily to a wide variety of site conditions. Prefers, but is not limited to, dry sandy soils. It is intolerant of shade. Primarily a weed of pastures, hay fields, roadsides, rights-of-way, and abandoned areas.	Seeds (one plant can produce 100,000 to 180,000 seeds with viability up to 100 years).
Cheatgrass	*Bromus tectorum*	Winter annual	Although *Bromus tectorum* can be found in both disturbed and undisturbed shrub-steppe and intermountain grasslands (e.g., where dominant grasses are *Agropyron spicatum* / *Pesudorogneria spicata* and *Festuca idahoensis*), the largest infestations are usually found in disturbed shrub-steppe areas, overgrazed rangeland, abandoned fields, eroded areas, sand dunes, road verges, and waste places.	Seeds.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
NEW INVADERS				
Hoary alyssum	*Berteroa incana*	Annual, biennial, or short-lived perennial	Meadows, pastures, roadsides, waste places, and rangelands. May outcompete native and cultivated species.	Seeds.
Russian knapweed	*Centaurea repens or Acroptilon repens*	Long-lived perennial (75 years)	Prefers heavy, often saline soils of bottomlands and sub-irrigated slopes and plains. Commonly found along roadsides, riverbanks, irrigation ditches, pastures, waste places, clearcuts, croplands, and hayfields. Prefers similar sites to those occupied by basin wildrye (*Elymus cinereus*). Does not readily establish in healthy native vegetation, requires disturbance.	Rhizomes (new shoots arise from creeping roots, up to 27 root shoots/ft^2 and roots can reach depths to 23 feet). Relatively few seeds are produced (viable for 2 to 3 years).
Rush skeletonweed	*Chondrilla juncea*	Perennial (many biotypes)	Sandy to gravelly, well-drained soils or shallow soils. Seedlings require moisture for up to 6 weeks to develop a persistent root system.	Seeds (up to 15,000/plant annually), lateral roots, and root fragments.
Houndstongue	*Cynoglossum officinale*	Biennial	Well-adapted to forested areas, roadsides, meadows, pastures, and waste places, often found on gravelly, somewhat alkaline soils.	Seeds, attach to fur and clothing.
St. Johnswort	*Hypericum perforatum*	Perennial	Rangeland and pastures (especially when poorly managed), fields, roadsides, forest clearings in temperate regions with cool, moist winters and dry summers. Grows best in open, disturbed sites and on slightly acidic to neutral soils. Does not tolerate saturated soils.	Seeds and rhizomes.
Dyer's woad	*Isatis tinctoria*	Winter annual, biennial, or short-lived perennial	Invades disturbed sites in rangelands, croplands, dry woodlands, and pastures. Can also invade native grasslands that are not highly disturbed.	Seeds.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
Dalmatian toadflax	*Linaria genistifolla ssp. delmatica*	Perennial	Rapidly colonize open or disturbed areas, especially roadsides, fences, rangelands, croplands, clearcuts, and pastures. Seedlings are ineffective competitors for soil moisture against established perennials and winter annuals, but, once established, both species of toadflax suppress other vegetation mainly by intense competition for limited soil water. Mature plants are particularly competitive with winter annuals and shallow-rooted perennials.	Seeds (up to 500,000 seeds per plant with viability up to 10 to 15 years) and creeping lateral roots.
Yellow toadflax	*Linaria vulgaris*	Perennial		Seeds (up to 30,000 seeds per plant with viability up to 10 to 15 years) and creeping lateral roots.
Scotch thistle	*Onopordum acanthium*	Biennial	Invades most habitats, dry to moist sites: waste places, roadsides, dry meadows, rangelands, pastures, and sometimes waterways.	Seeds (can remain viable for 30 years).
Sulfur cinquefoil	*Potentilla recta*	Perennial (long-lived)	Open grasslands, shrubby areas, open forests, logged areas, roadsides, waste places, and abandoned fields. Sulfur cinquefoil is a species of early succession and forest edge. It cannot survive shade, such as full forest canopy. Sulfur cinquefoil is becoming co-dominant with spotted knapweed on many sites and now is apparently replacing knapweed in some areas of western Montana.	Seeds (viable for at least 4 years) and broken roots can regenerate.
Tansy ragwort	*Senecio jacobaea*	Biennial (rarely annual or perennial)	Invades cut-over forest lands, irrigated and non-irrigated pastures, woodland pastures, and fallow lands. Although it prefers light, well-drained soils in cool, moist climates and rarely is tolerant of high water tables or acidic soils, it can grow throughout most soil moisture regimes, even hot, dry summers, and can over-winter in areas where temperatures reach -20°F or lower if there is good snow cover.	Seeds (viable for at least 6 years) and plants can regenerate top-growth when cut.
Common tansy	*Tanacetum vulgare*	Perennial	Prefers full sun and well-drained but moist soils and is prevalent along ditches, creeks, and roadways. Commonly occurs in disturbed areas at low elevations.	Seeds and rhizomes.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
Field pennycress	*Thlaspi arvense*	Summer or winter annual	A weed of disturbed or tilled areas.	Seeds, viability from 6 to 20 years depending on depth.
Bur buttercup	*Ranunculus testiculatus*	Annual	Open or disturbed ground in alkaline soils and semi-arid environments.	Seeds.
Blue mustard	*Chorispera tenella*	Winter annual	Dry disturbed sites, winter annual crops, especially winter wheat, roadsides, and waste places. Tolerates a broad range of moisture, temperature, and soil conditions.	Seeds.
POTENTIAL INVADERS				
Jointed goatgrass	*Aegilops cylindrica*	Winter annual	Wheatfields, grasslands, roadsides, fence rows, and other agriculture sites, mainly infests cropland.	Seeds (viable in soil up to 6 years).
Skeletonleaf bursage	*Ambrosia tomentosa*	Perennial	Poorly drained sites, subirrigated pastures, and irrigated land.	Seeds and deep creeping rhizomes.
Diffuse knapweed	*Centaurea diffusa*	Annual, biennial, or short-lived perennial	Disturbed or overgrazed lands are prime habitat, but can also invade undisturbed grasslands, shrublands, riparian communities, forested benchlands, and rugged terrain.	Seeds (up to 18,000 per plant).
Meadow knapweed	*Centaurea pratensis*	Perennial	Prefers moist roadsides, gravel bars, river banks, irrigated pastures, moist meadows, and forest openings.	Seeds.
Yellow starthistle	*Centaurea solstitialis*	Winter annual or biennial	Best adapted to open grasslands with deep well-drained soils and average annual precipitation of 10 to 60 inches.	Seeds (up to 10 years dormancy and viability).
Poison hemlock	*Conium maculatum*	Biennial, winter annual, or rarely perennial	Commonly occurs along roadsides, field margins, ditches, and in low-lying waste places. Can invade native riparian woodlands and open floodplains along waterways.	Seeds.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
Field bindweed	*Convolvulus arvensis*	Perennial	Agricultural lands and areas with similar disturbance regimes (little competition, repeated disturbance, and high light) are ideal for growth of this species.	Seeds (viable up to 50 years) and creeping deep roots.
Common crupina	*Crupina vulgaris*	Winter annual	Waste areas, arid hillsides, rangelands, and grassy slopes.	Seeds (viable 3 years or less).
Scotch broom	*Cytisus scoparius*	Woody perennial	Prefers sandy soils.	Seed, some sprouting (viable up to 80 years).
Toothed spurge	*Euphorbia dentata*	Annual	Pastures, hayfields, roadsides, and other non-crop areas.	Seeds.
Meadow hawkweed	*Hieracium pratense*	Perennial	Elevational range of 2000 to 5500 ft. in abandoned farmlands, pastures, lawns, fields, roadsides, mountain meadows, and forest clearings. They do not tolerate full shade, so they are not found in densely forested areas, but can dominate forest openings and margins. Prefer well-drained, coarse-textured soils moderately low in organic matter.	Seeds (wind-adapted), stolons, and rhizomes.
Orange hawkweed	*Hieraclum aurantiacum*	Perennial		Seeds (wind-adapted), stolons, and rhizomes.
Perennial pepperweed	*Lepidium latifolium*	Perennial	Can invade wide range of sites, but occurs most frequently in riparian zones, marshes, irrigation canals, wetlands, and floodplains. Can also prosper along roadsides, hay meadows, and rangelands.	Seeds and creeping roots.
Purple loosestrife	*Lythrum salicaria*	Perennial	Grows in wetlands, bogs, along stream and river banks, lake shores, in ditches, and disturbed wet soil areas.	Seeds and rhizomes.
Milium	*Milium vernale*	Winter annual	Sandy and other light soils that are moist in winter.	Seeds.
Eurasian watermilfoil	*Myriophyllum spicatum*	Perennial	Prefers lakes, ponds, and slow-moving rivers and streams, but can also grow in fast-moving water.	Produces seeds (rarely), but prolifically spread by runners and autofragments.

TABLE 3-3
Potential Habitat for Known Established, New, and Potential Invaders of Weed Species on the S-CNF

Common Name	Scientific Name	Life Cycle	Habitat Criteria and Site Adaptation	Mode of Reproduction
Matgrass	*Nardus stricta*	Perennial	Disturbed or heavily grazed grasslands.	Seeds.
Silverleaf nightshade	*Solanum elaeagnifolium*	Perennial	Disturbed sites such as fallow fields, gardens, and vacant areas, especially those with sandy soil.	Seeds and spreading rhizomes.
Buffalo bur	*Solanum rostratum*	Annual	Native to the central U.S. Adapted to sandy soil but able to grow on a wide range of soils from dry, hard soils to rich, moist soils.	Seeds.
Perennial sowthistle	*Sonchus arvensis*	Perennial	Adapted to many soil types and moisture regimes, seems to prefer low, fine-textured soils, like loams, and does better under alkaline or neutral conditions.	Seeds (2 to 5 year viability) and spreading, thickened horizontal roots (rhizomes).
Johnsongrass	*Sorghum halepense*	Perennial	Disturbed lands, such as ditches, cultivated fields, and idle farmlands. Most of the ecotypes are frost sensitive; cold-tolerant ecotypes have been found growing as far north as southern Canada.	Seeds and rhizomes.
Puncturevine	*Tribulus terrestris*	Annual	Grows on disturbed sites where it needs relatively high temperatures for germination and growth. Adapted to a wide range of soil conditions.	Seeds (viable in soil 4 to 5 years).
Syrian bean caper	*Zygophyllum fabago*	Perennial	Grows in disturbed areas, dry grasslands, and deserts in open, rocky soils, gravelly soils, sandy soils, and silt loam soils.	Seeds and lateral roots and root pieces.

Yellow toadflax. This perennial is becoming established in many areas of Idaho. It is a prolific seed producer. A mature plant can produce up to 30,000 seeds annually, and a stem has been reported to contain more than 5,000 seeds (Saner et al. 1995). This species can also reproduce vegetatively. Stems develop from adventitious buds on both primary and lateral roots. Vegetative reproduction from roots or root buds can occur as early as 2 to 3 weeks after germination. Vegetative reproduction is possible from root fragments only 1 centimeter long (Zimmerman 1996). This species is adapted to disturbance. Initially, seedlings are poor competitors and establishment is difficult where competitive vegetation is present. Yellow toadflax occurs on approximately 43 acres of the Yankee Fork Ranger District, 21 acres of the Salmon-Cobalt Ranger District, 8 acres of the North Fork Ranger District, and 1 acre of both the Challis and Lost River Ranger Districts.

Sulfur cinquefoil. This perennial has a woody rootstock, which sends up several vegetative shoots. Sulfur cinquefoil can form large patches in rangeland, roadsides, waste places, and unworked fields, where it is not easily controlled by mowing (Werner and Soule 1976). It is a strong competitor on many grazed rangeland sites because its high tannin content makes it unpalatable to most wildlife and livestock. In areas where sulfur cinquefoil grows with spotted knapweed, cattle will graze the knapweed over the cinquefoil (Rice et al. 1991). Sulfur cinquefoil occurs on 21 acres of the North Fork Ranger District and 1 acre of the Salmon-Cobalt Ranger District.

3) Historical Comparisons. The history and past treatments of weed infestations on the S-CNF were described in Chapter 1, *Section 1.C, Purpose and Need for Action,* and are compared here to present levels and species of weed infestations on the S-CNF. Noxious weed control on what is now the S-CNF began with the completion of NEPA documents (EAs) in the late 1980s for noxious weed management on the Salmon and Challis National Forests. An IPM weed control plan was adopted by the Salmon National Forest in 1987 and by the Challis National Forest in 1989 that focused on weed species of concern at that time. These species included established and/or new populations of spotted knapweed, leafy spurge, Canada thistle, musk thistle, and black henbane. Identified potential invaders included yellow toadflax on both the Salmon and Challis National Forests, and diffuse knapweed, yellowstar thistle, and dalmatian toadflax on the Challis National Forest.

Most weed species of concern in the late 1980s are among the same seven weed species of particular concern to the S-CNF today (see Table 3-1). Although not ranked among the most abundant weed species listed in Table 3-1, black henbane (a focus species in the late 1980s) continues to be present and of concern on the S-CNF. Black henbane presently occurs on approximately 25 acres of the Lost River Ranger District, 19 acres of the Leadore Ranger District, and 1 acre each of the North Fork and Salmon-Cobalt Ranger Districts. Bull thistle was not listed among the focus weed species for the Salmon and Challis National Forests, but today is present and of concern on the S-CNF, as are all of the weed species listed in Table 3-1.

Perhaps the most significant change in weed infestations on the S-CNF has been the tremendous increase in the occurrence of spotted knapweed. In 1987, spotted knapweed was estimated to cover a project area of approximately 1,000 acres in five drainages on the North Fork Ranger District, with approximately 120 acres targeted for treatment using biological controls. On the Salmon and Cobalt Ranger Districts in 1987, spotted knapweed covered a project area of approximately 100 acres in two drainages, with about 10 acres

targeted for treatment using herbicides. Today, spotted knapweed occupies approximately 54,568 acres at approximately 500 sites on the North Fork Ranger District and 7,539 acres at more than 500 sites on the Salmon-Cobalt Ranger District. Spotted knapweed also is present, but much less abundant, on all of the other S-CNF Ranger Districts.

The Forest Service (1987a, 1989) implemented the annual treatment of 200 to 300 acres of noxious weeds on both the Salmon and Challis National Forests beginning in the late 1980s. Weed treatments were very limited prior to 1995, but since then have generally increased each year from 586 acres treated in 1995 to 3,371 acres treated in 2001. Much of the early work was done in the North Fork Ranger District. Since 1995, virtually all of these acreages were treated using herbicides. However, biocontrol efforts were initiated in the late 1980s in the North Fork Ranger District. Size of the weed treatment area on the S-CNF in 2001 is equivalent to about 5 percent of the known, inventoried weed infestations present on the S-CNF.

b. Plant Communities

Potential Vegetation Groups (PVGs) are representative potential vegetation types that have similar environmental conditions and are dominated by similar plants and usually by similar life forms. The S-CNF is composed of PVGs as defined for the Interior Columbia Basin (Wisdom et al. 2000). The 10 PVGs for the S-CNF are: Cold Forest, Moist Forest, Dry Forest, Cool Shrub, Dry Shrub, Dry Grass, Woodland, Riparian Herbaceous, Riparian Woodland, and Riparian Shrub. Map 3-9 (back of chapter) depicts the locations of PVGs on the S-CNF. The PVGs were spatially identified from computer-enhanced color spectral band satellite imagery. Within each PVG are several categories of Potential Vegetation Types (PVTs), which are classified by the physical and biological environment, on the principle that the physical environment significantly influences vegetation growing on a given site. Each PVT category is named for its dominant species, whether that species remains onsite or not. There is considerable debate on whether the S-CNF supports the Dry Grass PVG. It is strongly believed the grassland community types present on the Forest are seral stages to the shrub-dominated Dry and Cool Shrub PVGs. However, for this discussion, the Dry Grass PVG will be described separately.

1) Plant Communities Susceptible to Invasive Weeds. The key component most affected by weed expansion and/or management practices is plant community composition. Many other resource values revolve around the plant community, such as sensitive plant species, wildlife and aquatic species and habitat (including threatened, endangered, and sensitive species), roadless values, recreation, and visual quality. Plant communities most susceptible to weed invasion occupy areas of relatively low precipitation and low production, and have relatively open canopies without substantial shade. Other plant communities are susceptible because of soil disturbance resulting from the removal of native vegetation caused by livestock grazing, roads, timber harvest, recreation activities, and fire. Plant community cover types present within the S-CNF that are susceptible to invasive weeds and can be influenced by weed expansion and/or management practices are listed below. Their susceptibility to the seven most abundant weed species on the S-CNF is listed in Table 3-4. The susceptibility of burned areas to these seven weed species also is listed in Table 3-4, and in all cases is high.

TABLE 3-4
Likelihood of Invasion of the Most Susceptible Broad-Scale Plant Community Types and Burned Areas on the S-CNF by the Seven Most Abundant Weed Species

		Weed Species						
Potential Vegetation Group (PVG)	**Plant Community Type**	**Spotted Knapweed**	**Musk Thistle**	**Canada Thistle**	**Bull Thistle**	**Leafy Spurge**	**Yellow Toadflax**	**Sulfur Cinquefoil**
Dry Grass/Dry Shrub	Grassland/Shrub-steppe	High	Moderate-High	High	Moderate	High	High	High
Cool Shrub	Shrub-steppe	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Dry Forest	Ponderosa pine	High	Moderate	Moderate	Moderate	Moderate	Moderate	High
Dry Forest	Douglas-fir	High	High	High	High	Moderate	Moderate	High
Riparian Herb, Shrub, and Woodland	Riparian Areas	High	Moderate-High	High	High	Moderate	Moderate	High
N/A	Burned Areas	High	High	High	High	High	High	High

Adapted from An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins, Volume II, Table 3.174, June 1997, and from Lolo National Forest Big Game Winter Range and Burned Area Weed Management Final EIS, Table III-3, July 2001.

High = high susceptibility to invasions-Invasive weed species invades the cover type successfully and becomes dominant or co-dominant even in the absence of intense or frequent disturbance.

Moderate = moderate susceptibility to invasion-Invasive weed species is a “colonizer,” and invades the cover type successfully following high intensity or frequent disturbance that impacts the soil surface or removes the normal canopy.

Low = low susceptibility to invasion-Invasive weed species does not establish because the cover type does not provide suitable habitat.

The extent of current inventoried weed infestation by PVG is shown in Table 3-5. These PVGs correspond roughly with wildlife source habitats discussed in Table 3-14, Chapter 3. Table 3-5 indicates that the North Fork Ranger District is most heavily infested by weeds and that the dry forest-ponderosa pine PVG has the most weed-infested area. This one PVG in the North Fork Ranger District has about 57 percent of the inventoried weed-infested land on the entire S-CNF (37,866 of 66,537 acres). About 75 percent of the dry forest-ponderosa pine PVG on the North Fork Ranger District is occupied by weeds. The dry grass type on the same Ranger District has the second highest rate of infestation with 10,413 acres or 16.5 percent of this PVG on this Ranger District. The dry shrub, cool shrub, and dry grass PVGs also have relatively high rates of weed infestation compared to the other vegetation types. These same PVGs are the most susceptible to future weed infestations.

TABLE 3-5
Inventoried Weed Infestations on the S-CNF by Potential Vegetation Group[1]

	Total (acres)	Weed Infestation (acres)	Infested Area (percent)
Challis Ranger District			
Cool Shrub	75,161	121	0.16
Dry Forest – Douglas-Fir	153,943	108	0.07
Dry Forest – Ponderosa Pine	137	0	0.00
Dry Grass	33,889	94	0.28
Dry Shrub	35,651	641	1.80
High Elevation (Cold Forest)	140,133	15	0.01
Other	1,127	0	0.00
Riparian	14,946	140	0.94
Woodland	6,326	4	0.07
Total:	***461,313***	***1,123***	***0.24***
Leadore Ranger District			
Cool Shrub	49,442	561	1.14
Dry Forest – Douglas-Fir	131,257	475	0.36
Dry Grass	33,214	142	0.43
Dry Shrub	9,124	213	2.33
High Elevation (Cold Forest)	73,624	18	0.02
Other	3,006	28	0.92
Riparian	27,683	174	0.63
Woodland	2,088	15	0.70
Total:	***329,437***	***1,626***	***0.49***
Lost River Ranger District			
Cool Shrub	255,348	176	0.07
Dry Forest – Douglas-Fir	145,588	82	0.06
Dry Grass	41,937	56	0.13

TABLE 3-5
Inventoried Weed Infestations on the S-CNF by Potential Vegetation Group[1]

	Total (acres)	Weed Infestation (acres)	Infested Area (percent)
Dry Shrub	60,030	138	0.23
High Elevation (Cold Forest)	237,913	23	0.01
Other	5,623	4	0.07
Riparian	42,838	42	0.10
Woodland	26,651	12	0.04
Total:	***815,928***	***533***	***0.07***
Middle Fork Ranger District			
Cool Shrub	140	0	0.00
Dry Forest – Douglas-Fir	25,833	0	0.00
Dry Forest – Ponderosa Pine	170	0	0.00
Dry Grass	6,656	15	0.22
High Elevation (Cold Forest)	8,873	0	0.00
Other	127	0	0.00
Riparian	5,031	10	0.20
Woodland	10	0	0.00
Total:	***46,841***	***25***	***0.05***
North Fork Ranger District			
Cool Shrub	3,742	377	10.07
Dry Forest – Douglas-Fir	236,875	0	0.00
Dry Forest – Ponderosa Pine	50,533	37,866	74.93
Dry Grass	63,220	10,413	16.47
Dry Shrub	7,009	911	13.00
High Elevation (Cold Forest)	25,518	2,415	9.46
Other	996	626	62.88
Riparian	29,289	1,791	6.11
Woodland	1,160	241	20.81
Total:	***414,599***	***54,640***	***13.18***
Salmon-Cobalt Ranger District			
Cool Shrub	52,178	1,778	3.41
Dry Forest – Douglas-Fir	418,451	2,903	0.69
Dry Forest – Ponderosa Pine	9,353	598	6.39
Dry Grass	57,090	1,485	2.60
Dry Shrub	6,677	457	6.85
High Elevation (Cold Forest)	31,764	354	1.11

TABLE 3-5
Inventoried Weed Infestations on the S-CNF by Potential Vegetation Group[1]

	Total (acres)	Weed Infestation (acres)	Infested Area (percent)
Other	1,600	78	4.87
Riparian	45,660	489	1.07
Woodland	988	40	4.06
Total:	***571,583***	***8,182***	***1.43***
Yankee Fork Ranger District			
Cool Shrub	52,719	126	0.24
Dry Forest – Douglas-Fir	233,137	23	0.01
Dry Grass	30,138	0	0.00
Dry Shrub	7,209	190	2.64
High Elevation (Cold Forest)	68,228	30	0.04
Other	1,234	3	0.22
Riparian	31,370	14	0.04
Woodland	619	22	3.57
Total:	***424,653***	***408***	***0.10***
GRAND TOTAL:	***3,064,355***	***66,537***	***2.17***

[1]Values may contain slight rounding error.

a) Dry Grass Potential Vegetation Group

Grassland communities within the S-CNF include foothill grassland with the following characteristic species:

Bunchgrass Type has some combination of bunchgrasses, particularly bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*). Other important species are Sandberg's bluegrass (*Poa secunda*), prairie junegrass (*Koelaria macrantha*), and arrowleaf balsamroot (*Balsamorhiza sagittata*). When these grasslands are disturbed by frequent fires or heavy use, they may no longer support bunchgrass but may instead support cheatgrass (*Bromus tectorum*) or Japanese brome (*Bromus japonicus*).

Fescue Grassland Types often occur in mountain meadows and are characterized by Idaho fescue. Other species that occur with Idaho fescue are tufted hairgrass (*Deschampsia caespitosa*) and sedges.

b) Dry Shrub Potential Vegetation Group

The Dry Shrub Type occurs extensively in the lowest elevations within the river breaks or corridors of the main stem of the Salmon River and adjacent to BLM lands, especially on the hotter, drier southerly aspects. These communities usually have bluebunch wheatgrass and Idaho fescue, but are also susceptible to invasion by cheatgrass (*Bromus tectorum*) or Japanese brome (*Bromus japonicus*) if disturbed. The Dry Shrub communities are also found

at moderate elevations nearing the ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudostuga menziesii*) series on favorable southerly aspects where they occur as scattered openings.

- Wyoming Big Sagebrush Type (ARTRW) is dominated by Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*) with an understory dominated by bluebunch wheatgrass and bluegrasses.
- Threetip Sagebrush Type (ARTR4) is dominated by either threetip sagebrush (*Artemisia tripartita*) or antelope bitterbrush (*Purshia tridentata*) with understories of bluebunch wheatgrass, arrowleaf balsamroot, Idaho fescue, rabbitbrush, and needle-and-thread.
- Black Sagebrush Type (ARARN) is dominated by black sagebrush (*Artemisia nova*) with bluebunch wheatgrass and/or Idaho fescue.
- Low Sagebrush Type (ARAR8) is dominated by low sagebrush (*Artemisia arbuscula*) with bluebunch wheatgrass and/or Idaho fescue. Low sagebrush often also occurs with junegrass, rabbitbrush, and Sandberg's bluegrass.

c) Cool Shrub Potential Vegetation Group

This vegetation group is characterized by the presence of mountain big sagebrush (*Artemisia tridentata* var. *vaseyana)*. This species generally is dominant at mid-elevation, cooler sites rather than Wyoming big sagebrush. On the S-CNF, mountain big sagebrush occurs with bluebunch wheatgrass and/or Idaho fescue. On slightly moister sites, mountain big sagebrush is often replaced as dominant by either serviceberry (*Amelanchier alnifolia*) or chokecherry (*Prunus virginiana*) and Idaho fescue. Mountain big sagebrush also grows in openings or in the understory of open stands of Douglas-fir.

d) Dry Forest Potential Vegetation Group

This group consists of four types: Douglas-fir with ponderosa pine, Douglas-fir without ponderosa pine, ponderosa pine grassland, and Douglas-fir grassland. It occupies the broadest range of environmental conditions of any conifer-dominated plant communities within the S-CNR. Habitat types common within this series range from savannah-like stands of Douglas-fir/bluebunch wheatgrass and Douglas-fir/Idaho fescue to very dense mixed stands of Douglas-fir and ponderosa pine in the Douglas-fir/ninebark habitat type. Ponderosa pine often with lodgepole pine (*Pinus contorta*) is a common seral species in many of the habitat types within this series (Steele et al. 1981). Large, essentially pure stands of Douglas-fir are present in the Douglas-fir/pinegrass habitat type at mid-elevation throughout the S-CNF.

The ponderosa pine grassland replaces the extensive sagebrush/bunchgrass communities at slightly higher elevations where minimum moisture requirements for pine establishment occur. Ponderosa pine stands thus constitute the lower elevation timberline with ponderosa pine/bluebunch wheatgrass, ponderosa pine/Idaho fescue, and ponderosa pine/common snowberry (*Symphoricarpos albus*) being the most common habitat types present. These habitat types are most prevalent between elevations of approximately 3,500 feet and 5,500 feet within the S-CNF. The ponderosa pine/bluebunch wheatgrass habitat type occupies the warmer, drier southerly aspects while ponderosa pine/Idaho fescue occurs on

the more moist north slopes. Ponderosa pine/common snowberry generally occupy less steep sites such as stream terraces and alluvial fans.

Douglas-fir grasslands are similar to ponderosa pine grasslands but usually occur at slightly higher elevations and have Idaho fescue as the dominant understory grass.

e) Riparian Herb, Shrub, and Woodland Potential Vegetation Group (Riparian Community Types)

Riparian communities that occur within the S-CNF are dominated by coniferous trees, deciduous trees, shrubs, and herbaceous vegetation (Youngblood et al. 1985). At mid to high elevations, Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) form the tree canopy in the conifer-dominated riparian communities. At lower elevations, these communities often contain aspen and/or cottonwood (*Populus trichocarpa*) as co-dominant species (Padgett et al. 1989). These species occur along with dense shrub layers of species such as willows and red-osier dogwood (*Cornus sericea*). At mid to lower elevations, lodgepole pine (*Pinus contorta*), Douglas-fir, and/or ponderosa pine also occur in riparian communities. Both willow and non-willow shrub-dominated riparian communities occur at all elevations on the S-CNF. Riparian communities dominated by herbaceous plants including grasses, forbs, and grass-like species (i.e., sedges and rushes) occur throughout the S-CNF. These communities represent a broad environmental spectrum ranging from ponds or perennially saturated sites to sites that are only wet seasonally (Padgett et al. 1989).

f) Woodland Potential Vegetation Group

Woodland Types within the S-CNF are dominated by mountain mahogany (*Cercocarpus ledifolius*) or aspen (*Populus tremuloides*).

Mountain Mahogany Type often has understories of needle-and-thread, bluebunch wheatgrass, Indian ricegrass (*Oryzopsis hymenoides*), and rabbitbrush. This type usually occurs as scattered stands. It is associated with limestone parent material and occurs within areas dominated by this series, especially on extremely rocky, harsh, southern-exposed slopes within the river canyons.

Aspen Type occurs on upland positions in either almost pure stands or mixed with conifers, usually Douglas-fir. This type often occurs in swales, in or adjacent to talus slopes, in snow pockets, or moister soil types within the S-CNF.

2) Plant Communities Less Susceptible to Invasive Weeds. Several Cold Forest Vegetation Groups, one Moist Forest Vegetation Group, and high elevation non-forested alpine areas are plant communities that also occur in the S-CNF, but that generally are not vulnerable to noxious weed invasion until they are disturbed by logging, windthrows, fires, or other disturbance. Cold Forest Types dominated by Douglas-fir and/or lodgepole pine are widespread at mid-elevations across the S-CNF. Cold Forest Types at high elevation (or at lower elevation in frost pockets) are generally dominated on dry sites by subalpine fir and/or Engelmann spruce, sometimes in combination with Douglas-fir. There is also a Moist Spruce-Fir Type that occurs on moister sites at mid to high elevations as described above under Riparian Herb, Shrub, and Woodland. On high elevation sites with stony soils, whitebark pine (*Pinus albicaulis*) often replaces the spruce-fir series (Johnson 1995). Limber

pine (*Pinus flexilis*) occasionally occurs on sunny, high elevation talus slopes, rocky ridges, or high, rocky valley bottoms.

If extensive land disturbance such as the recent wild fires on portions of the S-CNF occurs within these communities or vegetation group types, they may become more vulnerable to invasive weeds. Wild fires alter site characteristics and native vegetation by removing native plant cover and competition, exposing bare soil, altering soil physical properties, and disrupting normal plant/soil interactions. These conditions can last from just one growing season to a few years to many decades dramatically increasing the risk of weed establishment and expansion well into the future. This is especially true of hot, large-scale wild fires that remove significant natural shade and open formerly closed forest canopies to burgeoning weed populations.

3) Other Plant Communities. Plant communities that also occur in the S-CNF but that generally are not vulnerable to noxious weed invasion until they are disturbed by logging, windthrows, fires, or other disturbance include subalpine fir, whitebark pine, non-forested alpine, and Engelmann spruce series. If extensive land disturbance such as the recent wild fires on portions of the S-CNF occurs within these communities, it may make them more vulnerable to invasive weeds. This is especially true of hot, large-scale wild fires that remove significant natural shade and open formerly closed forest canopies to burgeoning weed populations.

4) Range and Riparian Condition. The Salmon and Challis Land and Resource Management Plans (LRMPs) displayed rangeland conditions that were inventoried in the late 1970s and 1980s. Of the allocated suitable rangelands, 43 percent were in excellent to good condition, 43 percent were in fair condition, and 14 percent were in less than satisfactory (poor to very poor) condition. Trend evaluations were reported in the S-CNF Monitoring and Evaluation Reports for Fiscal Years 1995 and 1996. Condition and trend studies were performed on more than 125 sites indicating 30 and 33 percent (respectively) had met objectives, 68 and 57 percent (respectively) were moving toward objectives, and 2 and 10 percent (respectively) were not meeting objectives.

Riparian condition descriptions in regard to vegetation community types are lacking in the two Forest Plans. Riparian condition was related to channel stability in the Challis LRMP. Of the 3 percent land base considered riparian, 24 percent was evaluated as being in a less than satisfactory condition based on channel stability assessments. Since the preparation of the Forest Plans, channel stability monitoring has increased throughout the Forest. The S-CNF Monitoring and Evaluation Reports for Fiscal Years 1995 and 1996 show monitoring sites of 102 and 100 sites, respectively, with 88 percent and 79 percent showing greater than 80 percent bank stability. These sites are not necessarily repeat measurements on the same site, however, those that were and that showed reduced stability were shifts between the highest class (90 to 100 percent stability) to the next class (80 to 90 percent stability). This apparent reduction in channel stability was attributed to the high flows experienced in 1996. Greenline studies designed to monitor the long term trend of vegetation community types were initiated in the mid 1990s on a few selected streams. Since then, permanent greenline studies have expanded throughout the Forest. Although shifts to more desirable riparian vegetation community types have been noted, it is too early to make definitive conclusions on riparian trends.

c. Plant Management Indicator Species

Several plant species were identified in the Challis Land and Resource Management Plan (USFS 1987c) as management indicator species (MIS). MIS are considered to be key species that represent life forms and have habitat requirements similar to other groups of plants. They are species for which populations and habitat objectives can be established, and will be tracked as indicators of habitat capability.

Of the eight plant MIS species, five are used to identify unsatisfactory conditions or trends either as increasing in abundance from naturally occurring levels or by their presence within a native vegetation community. Each is described below by life form.

Shrubs: Big sagebrush (*Artemisia tridentata*); three subspecies represented by basin big sagebrush (*tridentata*), Wyoming big sagebrush (*wyomingensis)*, and mountain big sagebrush (*vaseyana*). The basin and Wyoming big sagebrush community types occur in the Dry Shrub PVG while the mountain big sagebrush occurs in the Cool Shrub PVG. Increases in big sagebrush over 20 percent of natural levels indicate a decreasing ecological condition. Bitterbrush (*Purshia tridentata*) is recognized as important wildlife winter forage. Bitterbrush can occur in the transition zone between the Dry Shrub and Cool Shrub PVGs and can become co-dominant with mountain big sagebrush in the Cool Shrub PVG.

Grasses: Bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*) are indicative of climax rangeland conditions. These grasses often occur together in varying amounts depending on the site in the Dry Grass PVG. However, bluebunch wheatgrass is typically the dominant grass in the Dry Shrub PVG while Idaho fescue dominates the Cool Shrub PVG.

Forbs: Western yarrow (*Achillea millefolium*) and Canada thistle (*Cirsium arvense*) are indicative of disturbance in riparian areas. Western yarrow is a native perennial forb while Canada thistle is a state listed noxious weed and a target species in the weed treatment activities assessed in this Final EIS.

d. Threatened, Endangered, and Sensitive Plants

There are no federally listed threatened or endangered plant species present on the S-CNF.

1) Sensitive Species. Forest Service Manual (FSM) 2670.5 defines sensitive species as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution." In FSM 2670.22, management direction for sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species (U.S. Forest Service 1990a). In addition to Forest Service Region 4 sensitive species, the State of Idaho keeps current listings for all state-sensitive species by county where populations are known to occur. The S-CNF encompasses land across parts of four counties: Custer, Lemhi, Butte, and Blaine. All sensitive species and species of concern for these four counties are listed in Table 3-6 together with each species' status and habitat characteristics. These lists are subject to change as species are added, removed, or recategorized.

Not all of the state-sensitive species listed in Table 3-6 are likely to occur on the S-CNF. Appendix H presents the occurrence of sensitive plant species on the S-CNF by Ranger District and HUCs 4 and 5. Twenty-five species have been identified as sensitive by Forest Service Region 4 and are of special concern to the S-CNF, either because of known occurrences or known suitable habitat on the S-CNF. These species are as follows:

Pink Agoseris (*Agoseris lackschewitzii*). This species occurs in wet montane and subalpine meadows in the mountains of northwestern Wyoming, southwestern Montana, and adjacent Idaho. It flowers July to August. In Idaho, it has been found in Fremont and Lemhi Counties where it was growing either in open moist meadows with forbs, grasses, sedges, and rushes or in the ecotone between wet meadows and forests (Jankovsky-Jones 1999). When overstory trees are present they are usually subalpine fir, Engelmann spruce, whitebark pine (*Pinus albicaulis*), and Douglas-fir. Pink Agoseris is known to occur in Lemhi County in the Lemhi Range within the Mill Creek Basin. Associated species are tufted hairgrass, bistort (*Polygonum bistorta*), elephant's-head lousewort (*Pedicularis grounlandica*), and arrowleaf groundsel (*Senecio triangularis*) (NY Botanical Gardens Collection. Collected 1984. Specimen ID: 7047) (U.S. Forest Service 1990b).

Lost River milkvetch (*Astragalus amnis-amissi).* This species is endemic to Custer and Butte Counties. It occurs on ledges and rock crevices of nearly vertical limestone cliffs and in talus at the base. It prefers moist, shaded microsites within these general habitats (NY Botanical Gardens Collection. Collected 1957. Specimen ID: 5308; U.S. Forest Service 1990b). This milkvetch blooms June to July.

Lemhi milkvetch (*Astragalus aquilonius).* Lemhi milkvetch is endemic to east-central Idaho and occurs in Custer, Butte, and Lemhi Counties at lower elevations. It is found on unstable substrates, steep banks, sandy washes, and gullies within the shrub-steppe zone (U.S. Forest Service 1990a). This species blooms May to June.

Meadow milkvetch (*Astragalus diversifolius).* This species is endemic to central Idaho and northern Utah with one historical report for the Green River Basin in western Wyoming. It occurs on moist, often alkaline meadows and in sagebrush valleys.

White Cloud's milkvetch *(Astragalus vexilliflexus var. nubilus).* This species is found in dry, open ridges in the White Cloud Range.

Maritime sedge (*Carex incurviformis* var. *incurviformis).* This sedge occurs in alpine and subalpine zones on moist tundra and wet rock ledges. It is a circumpolar species that is known from high elevation areas in Canada and south to Colorado and California.

Flexible alpine collomia (*Collomia debilis* var. *camporum).* This species occurs on the North Fork of the Salmon River drainage in Idaho and in adjacent Montana. It inhabits stabilized talus slopes (Moseley 1992a).

Douglass' wavewing (*Cymopterus douglassii).* This plant is known from Custer County in Idaho on the Lost River Ranger District at high elevations over 9,000 feet. It occurs in alpine and subalpine zones on open slopes, ridges, and summits with calcareous or dolomitic substrates and blooms from mid-June to August (U.S. Forest Service 1990a). In high mountain cirque terrain it is found on sites that are level, gravelly, and with evidence of frost heaving (Moseley 1992b).

Ibapah wavewing *(Cymopterus ibapensis).* This species occurs in rocky, high-elevation sites in the central mountain region of Idaho.

Rockcress draba (*Draba densifolia apiculata).* This species occurs in moist, gravelly alpine meadows and on granitic talus slopes or rock crevices. This species usually prefers limestone-derived soils. It occurs at some high elevation sites in Wyoming, Utah, Montana, central Colorado, and Idaho.

Stanley whitlow-grass (*Draba trichocarpa).* This species is endemic to Idaho and all known populations are restricted to granite outcroppings surrounding the floor of the Stanley Basin in south-central Idaho. It is found in sagebrush/Idaho fescue (*Artemisia arbuscula* ssp. *thermopola/Festuca idahoensis*) habitat type variation with a mosaic that includes mountain big sagebrush (Moseley and Mancuso 1990). On a majority of sites, it was found growing with guardian buckwheat (see listing below). Both of these species were found on gentle ridgelines that are relatively stable and on steep rock outcrops and scree slopes (Moseley and Mancuso 1993).

Welsh's buckwheat (*Eriogonum capistratum* var. *welshii).* This species occupies rocky volcanic slopes. It is often associated with scattered sagebrush and grasses, usually at higher elevations.

Guardian buckwheat (*Eriogonum meledonum).* This species is endemic to Custer County in central Idaho. It occurs on unstable scree slopes on granitic parent materials (U.S. Forest Service 1990a).

Bugleg goldenweed (*Haploppus insecticruris).* Known distribution for this species is south-central Idaho in Camas and Elmore Counties. It inhabits sagebrush and grass meadows at 5,000 to 6,000 feet in elevation and blooms in July and August (U.S. Forest Service 1990a).

Bank monkeyflower (*Mimulus clivicola).* This plant is a regional endemic known from northern and west-central Idaho into northeastern Oregon. It is a small annual that produces a showy pink flower that blooms from late May through mid-July. The general habitat is open ponderosa pine stands within mesic macroclimates (such as moist drainages). Specific habitat requirements are very restricted: southern aspects between 1,500 and 4,100 feet in elevation, in moist pockets of open mineral soil (such as a depressions in game trails) (Lorain 1993). There are no known occurrences on the S-CNF, but many areas of potential habitat. There is no way of knowing how much potential habitat meets the specific microsite requirements for this species.

Challis crazyweed (*Oxytropis bessyi* var. *salmonensis*). This is a species of sagebrush and salt desert shrub habitat. It occurs in sandy washes and open slopes with rocky volcanic soils where it blooms June through July (U.S. Forest Service 1990a).

Lemhi penstemon (*Penstemon lemhiensis).* This species is endemic to Lemhi County and adjacent counties in Montana. Its bright sky-blue flowers appear from June to July. This penstemon is an early seral species that requires bare soil to become established. It appears to be dependent on small-scale disturbances and has adapted to man-made disturbed sites, such as road cuts and fills and responds favorably after fire. It occurs in a variety of habitats, including dry grasslands, three-tipped sage/Idaho fescue and big sagebrush/needle-and-thread communities, mountain big sagebrush/bluebunch wheatgrass, open conifer

ponderosa pine or Douglas-fir/grass lands, and ecotones between forest and shrub-steppe. It occurs at elevations from 3,200 to 8,100 feet (Moseley et al. 1990a; Moseley 1992a).

Since this species is widely adapted, there are many acres of apparently suitable habitat on the S-CNF. The characteristics of these potential sites give this species a high potential for occurring in areas that weeds also tend to prefer.

Salmon twin bladderpod (*Physaria didymocarpa* var. *lyrata).* This perennial mustard is endemic to Idaho. Until the 1980s, it was known only from one location on BLM land at Williams Creek in the Salmon River Mountains, then three new populations were found on private and BLM land (Hitchcock 1964; Steele 1977; Steele 1981; Steele 1983). In 1990, a specific search of the Salmon National Forest found no populations of Salmon twin bladderpod (Moseley et al. 1990b). Suitable habitat is believed to occur at lower elevations, just outside the S-CNF boundary, on drainages with headwaters in the S-CNF. All known populations are near the boundary of the S-CNF.

This species is found on scablands, shale banks, talus slopes, and gravelly soil (U.S. Forest Service 1990a). It grows on steep south-facing slopes between 4,050 and 6,800 feet in the big sagebrush/bluebunch wheatgrass zone. It has been found growing on loose, but stable, substrate along roadcuts and other disturbance sites. It is generally found on sites with little plant cover (Moseley et al. 1990b). These are the same site characteristics that weeds tend to prefer.

Marsh's bluegrass (*Poa abbreviata* ssp. *Marshii).* This dwarf grass is currently known from three states—Idaho, Nevada, and California. It grows on high alpine rocky slopes in scree and talus (Soreng 1991). These sites have short growing seasons and the possibility of heavy frosts at any time of the year. One known location in the Salmon River Basin of Idaho occurs within the Pahsimeroi Sub-basin.

Alkali primrose *(Primula alcalina).* This species is associated with wet, alkaline meadows; level benches adjacent to creeks or springs; and benches with hummocky topography, where they are found only on the tops and sides of the hummocks.

Wavy-leaf thelypody (*Thelypodium repandum).* This mustard is endemic to Custer County in central Idaho. It inhabits steep shale banks derived from volcanic and metamorphic rocks where it is associated with bunchgrasses and herbaceous perennials across a wide elevational range (4,900 to 7,000 feet). It blooms from May through September (U.S. Forest Service 1990a).

Stanley thlaspi (*Thlaspi idahoense* var. *aileeniae).* This mustard also is endemic to Custer County in central Idaho where it occurs on steep slopes on whitish sand among small rocks on sagebrush flats. It blooms from May to July (U.S. Forest Service 1990a).

Idaho range lichen (*Xanthoparmelia idahoensis).* Nothing more is known about this species than the information given in Table 3-6.

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Agoseris lackschewitzii	pink agoseris	**				Wet meadows with soil saturated through the growing season.	NI	S	S	
Allium anceps	two-headed onion			**		Heavy, barren soils of volcanic origin in swales, on flats, and slopes in the foothills and lowlands where water stands in the spring.		S2		
Antennaria arcuata	meadow pussytoes				**	Mesic natural grass-sedge meadow surrounded by sagebrush-steppe. Elevation 4,950 ft.	FACW	GP2		SC
Artemesia campestris ssp. *Borealis* var. *purshii*	northern sagewort		**			Open places, often in sandy soils.		S1		
Aster junciformis	rush aster		**			Fens, bogs, springs, and wet meadows; typically where the substrate remains saturated year-round.	OBL	S		
Astragalus amblytropis	Challis milkvetch	**	**			Volcanic ash deposits of lower sagebrush or shadescale-covered slopes.		GP3		
Astragalus amnis-amissi	Lost River milkvetch		**	**		Cracks in ledges of similar sites on near vertical limestone cliffs, and in talus at base of cliffs; mostly in moist shaded areas.		GP3	S	
Astragalus aquilonius	Lemhi milkvetch	**	**	**		Shale and gravel banks.		GP3	S	
Astagalus atratus var. *inseptus*	mourning milkvetch				**	Sagebrush slopes.		GP3		
Astragalus bisulcatus var. *bisulcatus*	two-groove milkvetch	**				Sagebrush desert and grasslands, often where alkaline.		S		
Astragalus diversifolius	meadow milkvetch	**	**	**		Moist, often alkaline soil.		GP2	S	

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Astragalus gilviflorus	plains milkvetch	**				Barren knolls, hilltops, and gullied badlands on limestone, shale, or sandstone.		S1		
Astragalus leptaleus	park milkvetch	**	**			Moist sedge-grass meadows, swales, and hummocks at edges of mountain brooks and among streamside willows.	OBL	M		
Astragalus oniciformis	Picabo milkvetch				**	Foothills of Sawtooth Mts.		GP3		
Astragalus paysonii	Payson's milkvetch		**			Burned and other open, disturbed sites between elevation 7,160 and 9,600 ft.		GP3	S	SC
Astragalus vexilliflexus var. *nubilus*	White Cloud's milkvetch		**			Dry open ridges in White Cloud Range.		GP2	S	
Botrychium campestre	prairie moonwort		**			Prairies, dunes, and fields over limestone. Elevation ,5000 ft.		S1		
Botrychium minganense	Mingan moonwort	**				Moist habitats in grand fir, subalpine fir, and lodgepole pine forest communities, as well as in brushfields.		S		
Botrychium simplex	least moonwort		**			Moist to dry meadows, bogs, swamps, roadside ditches, dry fields, and forests at middle elevations in the mountains.		S2		
Bouteloua gracilis	blue gramma	**				Shortgrass prairie habitat.		S1		
Camissonia pterosperma	winged-seed evening primrose			**		Desert shrub, sagebrush, and juniper communities.		S		
Carex breweri var. *paddoensis*	Brewer's sedge		**			Dry to wet soil or talus, near or above timberline.		S		
Carex buxbaumii	Buxbaum's sedge		**		**	Wet places such as streams, marshes, wet meadows, and peat bogs.	OBL	S		
Carex incurviformis var. *incurviformis*	maritime sedge		**			Alpine and subalpine moist tundra and wet rock ledges. Elevation 10,000 to 12,200 ft.		S2	S	

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Carex livida	pale sedge	**	**			Bogs and fens, swampy woods, or sometimes on mineral substrates adjacent to slow-moving streams; from low to moderately high elevations.	OBL	S		
Carex parryana ssp. *Idahoa*	Idaho sedge	**				Meadows and moist, low ground, plains, and foothills.	FACW	GP2		
Carex straminiformis	Mt. Shasta sedge		**		**	Subalpine and alpine areas on open slopes often near persistent snowbanks.		S		
Castilleja pulchella	beautiful indian paintbrush	**			**	Elevation 9,000 to 11,500 ft.		GP3		
Catapyrenium congestum	lichen			**		Sandstone rocks, deep loamy soils in sagebrush, and salt desert shrub types.		S		
Chrysosplenium tetrandrum	northern golden-carpet	**				Riparian areas with dense over- and under-story canopy on moss-covered logs, rocks, and gravels adjacent to small streams and rivulets in spruce.	OBL	S1		
Cladonia luteoalba	reindeer lichen	**				Middle Fork of the Salmon River in very shady, sheltered, rocky, mid-elevation habitat. Grows on *Cladonia borealis*.		GP2		
Collomia debilis var. *camporum*	flexible alpine collomia	**				Talus slopes at high elevations.		GP3	S	
Coryphantha vivipara	cushion cactus	**				Desert valleys and foothills.		S		
Cymopterus douglassii	Douglass' wavewing	**	**			Alpine and subalpine areas on open slopes, ridges, and summits in calcareous or dolomitic substrates.		GP3	S	SC
Cymopterus ibapensis	Ibapah wavewing					Rocky, high-elevation sites in this region of Idaho (central mountains)			S	

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Cypripedium parviflorum var. *pubescens*	small yellow lady's slipper				**	Bogs, damp woods, and wet areas in thickets. Clay loam soils, with a thick litter layer.	FACW	S1		
Draba densifolia apiculata	rockcress draba					Moist, gravelly alpine meadows and talus slopes, often on limestone-derived soils.			S	
Draba fladnizensis	Arctic draba		**			Alpine tundra, above timberline on dry, rocky slopes.		S1		
Draba incerta	yellowstone draba	**	**		**	Subalpine and alpine areas on open slopes often near persistent snowbanks.		S		
Draba trichocarpa	Stanley whitlow-grass		**			Steep slopes on granitic parent material.		GP2	S	SC
Drosera intermedia	spoon-leaved sundew		**			Bogs, fens, and moist, acidic, sandy soils; often in standing water. Idaho populations occur in peatland habitats.	OBL (NAT'L)	S1		
Eatonella nivea	white eatonella	**	**			Dry, cindery, sandy, or volcanic desert areas, often with sagebrush. Also in dry washes in salt desert shrub.		S		
Epilobium paulstre	swamp willow-weed		**			Wet soil.	OBL	M		
Epipactis gigantea	giant helleborine	**	**			Moist areas such as springs, streambanks, seeps, and thermal sites.		S2		
Erigeron humilis	low fleabane	**	**	**		Talus and scree slopes above treeline.				
Erigeron salmonensis	Salmon River fleabane	**				Steep, north-facing rock faces, especially in moist areas or within the mist zone of waterfalls, usually on sites with granitic substrates.		GP3		SC
Eriogonum capistratum var. *welshii*	Welsh's buckwheat	**	**			Rocky volcanic slopes and gravelly clay or sedimentary barren flats with minimal vegetation consisting of scattered sagebrush and grasses.		GP2	S	

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Eriogonum meledonum	guardian buckwheat		**			Unstable scree slopes on granitic parent materials.		GP1	S	SC
Gentianella propinqua	four-parted gentian		**			Forests, meadows, along streambanks, on dry, open rocky slopes and as a calciphile in sedge tussocks in Arctic tundra.	FACW	M		
Gentianella tenella	slender gentian		**			Moist subalpine and alpine meadows.		S2		
Hackelia davisii	Davis' stickseed	**	**			Cliffs or talus near base of cliffs, generally below elevation 5,500 ft.		GP3		
Halimolobus perplexa var. *lemhiensis*	puzzling halimolobus					Granitic substrates in open ponderosa pine and Douglas-fir.		M	S	
Haploppus insecticruris	bugleg goldenweed				**	Sagebrush and grass meadow areas around elevation 5,000 to 6,000 ft.		GP3	S	SC
Helodium blandowii	Blandow's helodium moss	**	**			Organic soil in wet seeps or in dry meadows with sedge.		S		
Ipomopsis (Gilia) polycladon	spreading gilia			**		Desert shrub, sagebrush, and juniper communities, often on sandy soil.		S2		
Kobresia simpliciuscula	simple kobresia	**	**			Bogs and other wet places, montane, but generally not above timberline.	FAC	S2		
Lewisia kelloggii	Idaho bitterroot	**	**			Gravelly soil where moist in early spring, especially near snowbanks.		S1		
Lomatogonium rotatum	marsh felwort	**	**			Wet, often saline soil, montane.	OBL	S1		
Meesia longiseta	meesia moss	**				Immersed and emergent in eutrophic fens, swamps, and very wet sedge mats with areas of open water.		S1		
Mimulus clivicola	bank monkeyflower					Moist pockets of open mineral soil on south aspects.		M	S	

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

Scientific Name	Common Name	County Occurrence[2]				Habitat Association	Wetland Status[3, 4]	Status		
		Lemhi	Custer	Butte	Blaine			State (CDC)[5]	USFS (Region 4)	Federal
Orthotrichum hallii	moss		**	**		Fens and shady granitic rock outcrops.		S1		
Oxytropis besseyi var. *salmonensis*	Challis crazyweed		**			Sagebrush and salt desert shrub in sandy washes or open slopes of rocky volcanic soil.		GP3	S	
Papaver radicatum ssp. *Kluanense*	Arctic poppy	**				Very high elevation.		SX		
Parnassia kotzebuei var. *kotzebuei*	Kotzebue's grass-of-parnassus		**			Moist rock ledges, and crevices in subalpine and alpine zones.		M		
Penstemon lemhiensis	Lemhi penstemon	**				Grassland and open ponderosa pine forests between elevation 6,300 and 7,200 ft.		GP3	S	SC
Phacelia inconspicua	obscure scorpion plant			**	**	Rocky or bare, northerly facing slopes of sagebrush/grass. Loose soil rich in organic matter.		GP1		SC
Phacelia lyallii	Lyall's phacelia	**				Talus slopes and rock crevices at high elevations, often above timberline.		S		
Physaria didymocarpa var. *lyrata*	Salmon twin bladderpod	**				Rocky, sparsely vegetated, south slopes. Bare ground and rock coverage (1-3 inches rock).		GP1	S	SC
Poa abbreviata ssp. *Marshii*	Marsh's bluegrass		**	**	**	Alpine fell-fields.		GP2	S	
Polystichum kruckebergii	Kruckeberg's sword-fern		**			Cliff crevices and talus slopes, mid-montane upward to near timberline.		S		
Primula alcalina	alkali primrose	**	**			Wet, alkaline meadows; level benches adjacent to creeks or springs; benches with hummocky topography, where they are found only on the tops and sides of the hummocks.	OBL	GP1	S	SC
Ranunculus gelidus	Arctic buttercup		**			Talus slopes and in alpine meadows.		S1		
Ranunculus pygmaeus	pygmy buttercup		**			High, alpine meadows.		S		

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3, 4]	State (CDC)[5]	USFS (Region 4)	Federal
Salix candida	hoary willow	**	**	**		Bogs, fens, marshes, pond edges, and seepage areas.	OBL	S		
Salix farriae	Farr's willow		**			Moist streamsides and lakeshores between elevation 9,000 and 9,300 ft.	OBL	S2		
Salix pseudomonticola	false mountain willow	**				Mid-montane to alpine.	FACW	S2		
Saxifraga adscendens var. *oregonensis*	wedge-leaf saxifrage		**		**	Alpine and subalpine areas on moist ledges and in rock crevices.		M		
Saxifraga cernua	nodding saxifrage		**	**	**	Moist rock crevices and gravelly meadows over elevation 10,000 ft.		S		
Scirpus rollandii	Rolland bulrush		**			Calcareous montane bogs. Elevation 6,600 ft.		GP3		
Sedum borschii	Borsch's stonecrop	**				Talus slopes and north slopes in the shade of Douglas-fir.		M		
Silene scaposa var. *lobata*	scapose silene			**		Sagebrush and pinyon-juniper.		M		
Silene uralensis ssp. *Montana*	petalless campion	**	**		**	Alpine tundra, talus slopes, riverbanks, and meadows.		S1		
Stylocline filaginea	stylocline				**	Open, dry, or vernally moist habitats in the valleys and foothills on shallow stony basalt with cindery, graveled surface. Associated with alkali sage, Owyhee sage, or stiff sage.		M		
Sullivantia hapemanii var. *hapemanii*	Hapeman's sullivantia	**				Hanging gardens; wet cliffs of various geology including lime-stone, shale, and quartzite.		GP3		SC
Thamnolia subuliformis	lichen	**				Exposed sandstone outcrop or rocky soils, south-facing slope.		S1		

TABLE 3-6
Special-Status Plant Species on the S-CNF or within Lemhi, Custer, Butte, and Blaine Counties[1]

		County Occurrence[2]						Status		
Scientific Name	Common Name	Lemhi	Custer	Butte	Blaine	Habitat Association	Wetland Status[3,4]	State (CDC)[5]	USFS (Region 4)	Federal
Thelypodium repandum	wavy-leaf thelypody	**	**			Moderate to steep, unstable, generally southerly facing slopes of rocky, gravelly to cindery substrate derived from Challis volcanic and metamorphic rock. Associated vegetation is sparse (5 to 20% cover), and bare ground coverage is high.		GP3	S	SC
Thlaspi idahoense var. *aileeniae*	Stanley thlaspi		**			Rocky, sandy flats with sagebrush or river gravel.		GP3	S	
Xanthoparmelia idahoensis	Idaho range lichen	**				Mountain rangelands of central Idaho in sagebrush.		GP2	S	

[1]These lists are subject to change as species are added, removed, or recategorized.

[2]** = Found in County

[3]Northwest Regional Indicator Status unless otherwise indicated

[4]NI–No Indicator Status; OBL–Obligate Wetland; FACW–Facultative Wetland; FAC–Facultative

[5]SX–State Extinct; S1–State Priority 1; S2–State Priority 2; S–State sensitive; M–State Monitor; GP1–Global Priority 1; GP2–Global Priority 2; GP3–Global Priority 3; SC–Species of Concern

Two additional Forest Service sensitive plant species of concern are described in the following text because they occur in habitats similar to habitats preferred by weeds. These are early successional (disturbance) species that may occupy habitat openings, particularly after fire. Appendix H shows their occurrence on the S-CNF by Ranger District and HUCs 4 and 5.

Payson's milkvetch (*Astragalus paysonii).* Payson's milkvetch is a regional endemic known only from central and southeastern Idaho and southern Wyoming. This is a perennial species, which blooms July to August. It is a seral species that requires mineral soil (usually sandy soils with low cover of herbs and grasses) for establishment. These are the same conditions that generally favor weed invasion. Fire suppression (which is a factor in plant succession and canopy closure) may be decreasing the potential habitat for this species because it favors openings in stands of ponderosa pine, Douglas-fir, and sometimes lodgepole pine. All known locations of Payson's milkvetch are in disturbed areas, including recovering burns, clearcuts, trail edges, old skid trails, and road cuts.

After fires the potential for suitable habitat on the S-CNF for this species may increase. The characteristics of burn sites may give this species a higher potential for occurring in areas at risk from weed invasions.

Puzzling halimolobos (*Halimolobus perplexa* var. *lemhiensis).* This regional endemic occurs in central Idaho in Custer, Valley, and Lemhi Counties. Like Payson's milkvetch, it is a seral species requiring disturbance and bare soil to become established. It inhabits gravelly or sandy slopes, roadcuts, and dredge tailings with granitic substrates (U.S. Forest Service 1990a). It also occurs on grassy slopes adjacent to rock outcrops in open ponderosa pine and Douglas-fir forests (U.S. Forest Service 1999a). Many areas of potential habitat for puzzling halimolobos exist within the S-CNF with characteristics similar to those preferred by weeds.

2) **Habitat Associations.** Many of the sensitive plant species for the S-CNF that were described above and/or listed in Table 3-6 do not have broad habitat amplitude. Table 3-7 lists those species known to grow within specific habitats or to be associated with specific topographic parameters. Those species listed under the heading "early seral/disturbed sites" are likely to have the greatest potential for co-occurrence with noxious weeds because of the nature of these sites.

TABLE 3-7
Sensitive Plant Species Known to Grow Within Specific Habitats or Associated with Specific Topographic Parameters

Common Name	Scientific Name
Alpine	
Maritime sedge	*Carex incurviformis*
Rockcress draba	*Draba densifolia* var. *apiculata*
Marsh's bluegrass	*Poa abbreviata* ssp. *Marshii*
White Cloud's milkvetch	*Astragalus vexilliflexus* var. *nubilus*
Douglass' wavewing	*Cymopterus douglassii*
Welsh's buckwheat	*Eriogonum capistratum welshii*

TABLE 3-7
Sensitive Plant Species Known to Grow Within Specific Habitats or Associated with Specific Topographic Parameters

Common Name	Scientific Name
Wet Meadows	
Pink agoseris	*Agoseris lackschewitzii*
Meadow milkvetch	*Astragalus diversifolius* var. *diversifolius*
Ute ladies'-tresses	*Spiranthes diluvialis*
Alkali primrose	*Primula alcalina*
Talus/Scree Sites	
Lost River milkvetch	*Astragalus amnis-amissi*
Flexible alpine collomia	*Collomia debilis* var. *camporum*
Stanley whitlow-grass	*Draba trichocarpa*
Guardian buckwheat	*Eriogonum meledonum*
Wavy-leaf thelypody	*Thelypodium repandum*
Early Seral/Disturbed Sites	
Lemhi penstemon	*Penstemon lemhiensis*
Salmon twin bladderpod	*Physaria didymocarpa* var. *lyrata*
Lemhi milkvetch	*Astragalus aquilonius*
Payson's milkvetch	*Astragalus paysonii*
Puzzling halimolobos	*Halimolobos perplexa* var. *lemhiensis*
Marsh's bluegrass	*Poa abbreviata* ssp. *Marshii*

3.C.2. Aquatic Resources

a. Habitat Conditions and Threats

The watersheds within the S-CNF provide habitat for more than 20 fish species, including game and non-game species, endangered and threatened anadromous species, and threatened and sensitive resident species. These watersheds also support a variety of benthic invertebrates that are typically important fish foods, as well as several sensitive or rare species of frog, toad, and salamander that are associated with aquatic habitats. Noxious weeds have been shown to influence soil erosion and sedimentation (Lacey et al. 1989), which can adversely affect aquatic resources of the S-CNF. Forest and land management practices also may affect fish and their habitat. Excessive sedimentation can alter the streambed, affect spawning and rearing areas and success, and raise water temperatures, resulting in adverse effects to aquatic habitat quantity and quality and the well-being of fish and benthic invertebrate communities. Government agencies as well as private individuals have stocked fish in some streams and high mountain lakes of the S-CNF. Interbreeding between stocked fish and resident species affects the productivity and genetic integrity of some (primarily westslope cutthroat trout and bull trout) native fish populations (Quigley and Arbelbide 1997). In addition, stocked fish can adversely affect native fish species by successfully competing for food and space.

Corridors of the Salmon River and its major tributaries (the Pahsimeroi and Lemhi Rivers and their associated tributaries) are vulnerable to weed invasions. These systems provide important natural habitat conditions for fish and benthic organisms. They support migration, spawning, rearing, and overwintering by different life stages of anadromous species, and they provide year-round habitat for all life stages of resident species. The river corridors are subject to intense use by humans and wildlife. Human activities include diversion of water from the Salmon River watershed for livestock, agriculture, and community water use. Recreational activities like camping, fishing, and whitewater rafting are popular on nearly every stretch of these rivers. Mining, timber, and livestock grazing activities can also affect the quality of the habitat.

Generally, instream flows on the S-CNF adequately support healthy riparian communities and aquatic habitat. These flows are affected by human use (primarily irrigation) at lower elevations, sedimentation, and drought.

Roads confine many of the rivers and major streams on the S-CNF. These roads can contribute to the sedimentation of drainages and provide avenues for the proliferation of noxious weeds. Road construction has reduced riparian habitat, thus reducing the recruitment of wood into the stream channels that contribute to the formation of pools and provides cover for aquatic species. Conversion of some riparian areas to other uses further degrades habitat by removing native vegetation and replacing it with non-native grasses and other landscaping, thereby increasing an area's vulnerability to noxious weeds.

Weed control at or near the headwaters of rivers and tributaries on the S-CNF can have a direct beneficial downstream effect on riparian habitat and the health of aquatic resources by reducing seed dispersal and the threat of weed establishment. As noted previously (Lacey et al. 1989), noxious weeds have been shown to influence soil erosion and sedimentation, adversely affecting aquatic habitat and fish populations.

b. Special Status Species: Federally Listed Fish

The USFWS stated in their Section 7 consultation letter for the proposed project that four species of federally listed fish may occur within the S-CNF (see Appendix G). The USFWS identified these species as sockeye salmon, chinook salmon, steelhead, and bull trout. The federally listed representatives of these four species that may occur on the S-CNF are the Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River steelhead, and bull trout. The sockeye salmon is listed as endangered and the other fish species are listed as threatened. In addition, the S-CNF contains designated critical habitat for Snake River sockeye salmon, designated critical habitat and Essential Fish Habitat (EFH) for Snake River spring/summer chinook salmon, and proposed designated critical habitat for bull trout. The salmon and steelhead are under the jurisdiction of the National Marine Fisheries Service (NMFS) and bull trout are under the jurisdiction of the USFWS. These lists are subject to change as species are added, removed, or recategorized.

The populations of these four species have been declining. Habitat degradation has been shown to play an important role in their decline. These species occur in habitats adjacent to areas that have been invaded by weeds or are potentially vulnerable to weed invasion, and could potentially be affected by the presence and/or treatment of noxious weeds. The four federally listed fish species are discussed in the following text and shown in Table 3-8.

Appendix H presents information on their occurrence on the S-CNF by Ranger District and HUCs 4 and 5.

TABLE 3-8
Threatened and Endangered Fish Species Under the ESA that may Potentially Occur within the S-CNF[1]

Common Name	Scientific Name	Habitat	Federal Status
Snake River sockeye salmon	*Oncorhynchus nerka*	Mountain lakes; low to mid-gradient creeks and rivers; range from high mountain spawning streams and lakes to Pacific Ocean; cold, clear, well-oxygenated water	E
Snake River spring/ summer chinook salmon	*Oncorhynchus tshawytscha*	Low to mid-gradient creeks and rivers; range from high mountain spawning streams to Pacific Ocean; cold, clear, well-oxygenated water	T
Snake River steelhead	*Oncorhynchus mykiss*	Low to mid-gradient creeks and rivers; range from high mountain spawning streams to Pacific Ocean; cold, clear, well-oxygenated water	T
Bull trout	*Salvelinus confluentus*	Large, woody debris; undercut banks, boulders, and pools; clean, cold, well-oxygenated water	T

E = endangered
T = threatened

[1]These lists are subject to change as species are added, removed, or recategorized.

Snake River Sockeye Salmon. This species was listed by NMFS as endangered on November 20, 1991, and today consists of a remnant population associated with Redfish Lake in the Upper Salmon River Basin in Idaho (56 FR 58619). Critical habitat for Snake River sockeye salmon was designated on December 28, 1993, and includes the Salmon River Basin from its confluence with the Snake River to five lakes in the Sawtooth National Recreation Area and all connecting corridors. Watersheds containing suitable spawning and rearing habitat for this species total approximately 510 square miles and lie partially or wholly within Blaine and Custer Counties (NMFS 2002).

Like other anadromous salmonids, sockeye salmon require habitat that includes four components: 1) spawning and juvenile rearing areas; 2) juvenile out-migration corridors; 3) areas for growth and development to sexual maturity; and 4) adult spawning migration corridors (58 FR 68543). Historically, this population of Snake River sockeye salmon migrated from the Pacific Ocean up the Columbia, Snake, and Salmon Rivers to Redfish Lake, then spawned in the lake's main tributary (Redfish Lake Creek). Juveniles reared for 2 years in Redfish Lake, then migrated to the ocean where they grew for 2 years and matured sexually before returning to spawn (Simpson and Wallace 1978).

Until recently, no more than eight adult sockeye salmon have returned annually to Redfish Lake to spawn. However, over the last few years from 30 to over 200 fish have returned primarily because of hatchery support (personal communication between Bob Rose, S-CNF, and Mel Hughes, Sawtooth Hatchery, June 1, 2002). Population declines have been attributed primarily to mainstem dams on the Columbia and Snake Rivers that have

blocked access to spawning and rearing areas and also caused mortalities to migrants (58 FR 68543; Quigley and Arbelbide 1997). A hatchery-based captive brood stock program on the Upper Salmon River has been in operation since 1984 in an attempt to prevent extinction of the Snake River sockeye salmon.

Snake River Spring/Summer Chinook Salmon. This species was listed by NMFS as threatened on April 22, 1992 (57 FR 34953). Critical habitat was designated on December 28, 1993, and revised on October 25, 1999. Within the S-CNF, critical habitat for the Snake River spring/summer chinook salmon includes all river reaches in the Salmon River Basin presently or historically accessible to natural populations of this species, except for stream reaches upstream of impassable natural falls (NMFS 2002b).

Pursuant to Section 305(b) of the Magnuson-Stevens Act and its implementing regulations, 50 CFR part 600.920, Federal agencies must consult with NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken that may adversely affect EFH. The Magnuson-Stevens Act, Section 3, defines EFH as "those waters and substrate necessary for fish for spawning, breeding, feeding, or growth to maturity." Based on this definition, EFH for Snake River spring/summer chinook salmon on the S-CNF would include all of those drainages on the S-CNF that have been designated as critical habitat for this species.

This species requires a variety of freshwater habitats for migrations, spawning, rearing, and overwintering, and marine habitats for growth to adulthood. Healthy riparian zones (with large woody overgrowth) also contribute to the essential freshwater habitat of this species (58 FR 68543), the same as for all salmonids. Adult spring/summer chinook salmon enter the Columbia River on spawning migrations to the Salmon River Basin from March through May. Spawning occurs during fall in clean large gravels and small cobbles with well-oxygenated water, often in the upper reaches of larger drainages or tributaries. Young emerge from gravels the following spring and rear for 1 year in freshwater ("stream-type" life history strategy) before outmigrating to the ocean. Adults usually spend 3 or 4 years at sea growing and maturing before returning to their natal streams to spawn (Simpson and Wallace 1978).

The Snake River spring-summer chinook salmon is one of the salmonids most at risk of those present on the S-CNF. Within the Columbia River Basin, stream-type chinook salmon populations are found only within 28 percent of their historic range (Quigley and Arbelbide 1997). Factors generally associated with impacted salmon populations include the effects of one or more of the following: hydroelectric dams on the Columbia and Snake Rivers; genetic introgression with hatchery fish; unproductive ocean conditions; degraded spawning substrate; warm water temperatures; predation by non-native fish on juvenile outmigrants, especially in mainstem reservoirs; reduced instream flows; and overharvest (USFWS et al. 2000).

Snake River Steelhead. This species is the inland anadromous form of rainbow trout. Wild steelhead stocks originating in the Snake River Basin (including the Salmon River Basin) were listed by NMFS as threatened on August 18, 1997 (62 FR 43937). Critical habitat for this species was designated on February 16, 2000, and includes drainages within the S-CNF (65 FR 7764). However, on April 30, 2002, the U.S. District Court approved a NMFS consent decree withdrawing the February 2000 critical habitat designation for the Snake River

steelhead evolutionarily significant unit (ESU) and 18 other steelhead and salmon ESUs, citing the need for a thorough analysis of economic impacts (NMFS 2003). NMFS anticipates re-issuing critical habitat designations for these ESUs after the economics analysis is complete.

As with other salmonids, essential features of critical habitat include: 1) substrate, 2) water quality, 3) water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) safe passage conditions.

Like other anadromous species of the S-CNF, Snake River steelhead migrate up the Columbia, Snake, and Salmon Rivers and often spawn in upstream reaches of Salmon River tributaries. Adults enter freshwater between May and October (summer-run fish) and spawn the following spring. Young emerge from gravels during late spring to early summer and spend one or more years in freshwater before beginning downstream migrations to the ocean (Simpson and Wallace 1978).

Steelhead are widely distributed throughout waters of the S-CNF. Current populations occupy from 45 percent to 50 percent of watersheds within the basin. Steelhead populations have suffered declines from the same types of events and factors as listed for chinook salmon (Quigley and Arbelbide 1997).

Bull Trout. This species belongs to a sub-group of trout-like salmonids known as char. The Columbia River Basin bull trout was listed by the USFWS as threatened on June 10, 1998 (64 FR 58909). On November 1, 1999, the USFWS determined threatened status for all populations of bull trout within the contiguous (lower 48) U.S. (64 FR 58910). On November 29, 2002, Federal Register Notice 67 FR 71236 was published proposing designated critical habitat for bull trout, initiating the public comment period. The proposal included the Salmon River Basin and waters within the S-CNF. Bull trout can exhibit resident, fluvial (migrate between streams and larger rivers), or adfluvial (migrate between streams and lakes) life history strategies. Ideal habitat for bull trout includes clean cold waters with large woody debris, undercut banks, boulders, and deep pools (Quigley and Arbelbide 1997). Watersheds must have the specific physical characteristics to meet these habitat requirements for bull trout to successfully spawn and rear. Spawning usually occurs during late summer and early fall, often at sites of groundwater upwelling, with young emerging the following spring (USFWS et al. 2000).

One of the remaining core areas of bull trout distribution is the Salmon River watershed and mountains of Central Idaho. The distribution of bull trout populations is spotty, and generally occurs where habitat remains in good condition. The decline of this species has been attributed primarily to poor land management practices that contribute to degraded instream and riparian habitat conditions (Quigley and Arbelbide 1997).

c. Other Rare and Sensitive Aquatic Species

Westslope Cutthroat Trout. Westslope cutthroat trout is listed as a sensitive species by the Forest Service and as a priority species of special concern by the State of Idaho because of habitat degradation and declines of genetically pure populations (IDFG 2001). This species is widely distributed throughout the S-CNF (see Appendix H for distribution information by Ranger District and HUCs 4 and 5). However, like bull trout, it is largely dependent on high-quality habitat for survival, including cold water, numerous deep pools, and stream

beds that are relatively free of sediment (Quigley and Arbelbide 1997). The strongest populations of Westslope cutthroat trout occur in watersheds less influenced by roads or land management practices. Stocked non-native species of cutthroat and rainbow trout can also adversely affect Westslope cutthroat trout by hybridization. Migratory populations of this species are most significantly affected by the loss of viable habitat (Quigley and Arbelbide 1997).

Redband Trout. Redband trout *(Oncorhynchus mykiss)* is the native resident form of rainbow trout and is closely related to the anadromous variant (steelhead) of this species (Behnke 1992). Redband trout is listed as a priority species of special concern by the State of Idaho because of habitat degradation (IDFG 2001). This species spawns during spring and is generally more tolerant of higher water temperatures than either bull trout or Westslope cutthroat trout. Redband trout occupy a wide array of habitats throughout the S-CNF, and historically were widely distributed throughout the forest. This species displays a historic persistence even in heavily disturbed areas. However, relatively few strong populations exist today because of habitat segmentation and alteration, and hybridization with introduced species of hatchery-reared rainbow trout (Quigley and Arbelbide 1997).

Pacific Lamprey. This species (*Lampetra tridentata*) is a native anadromous lamprey. Like anadromous fish, this lamprey is believed to have historically migrated to all waters accessible to the more glamorous anadromous salmonids. They are a predacious parasite that feed off live fish. Lampreys require low gradient water with muddy bottoms, where young lampreys will burrow into the mud and consume microscopic plants. Returns of adults to the Snake River Basin have declined to less than a few hundred individuals. Because of this, the State of Idaho has listed Pacific lamprey as an endangered nongame species (IDFG 2001).

White Sturgeon. The Snake River population of this species (*Acipenser transmontanus*) has been identified by USFWS and the State of Idaho as a species of concern. It has been adversely affected by hydropower projects through migration barriers and population fragmentation (Quigley and Arbelbide 1997) and by overfishing (IDFG 2001). The Snake River population of white sturgeon occurs in the Snake River and in the mainstem Salmon River upstream to Clayton. This large, long-lived, bottom-oriented species is associated with large cool rivers (Simpson and Wallace 1978). It spawns in late spring/early summer over a rocky bottom in swift current near rapids. White sturgeon may not reach sexual maturity and spawn until 10 to 15 years of age. The largest sturgeon recorded from Idaho was a 1,500-pound fish caught in 1898 on a set line in the Snake River near Weiser (Simpson and Wallace 1978).

Columbia Spotted Frog. The Columbia spotted frog (*Rana luteiventris/R. pretiosa*) is a Forest Service sensitive species. It is highly aquatic and lives in or near permanent bodies of water, including lakes, ponds, slow streams, and marshes. It prefers areas with thick algae and sparse emergent vegetation, but sometimes hides under decaying vegetation. This frog is usually found in non-woody wetland habitats (sedges, rushes, and grasses). In the northern part of its range where snow and ice accumulate, spotted frogs are inactive during the winter and most hibernate and aestivate. The Columbia subspecies of the spotted frog is distributed over a wide range of altitudes, and in Washington has been found from approximately 1,700 to 3,100 feet above sea level (Leonard et al. 1993). There are many known occurrences of this species on the S-CNF (see Appendix H).

Western Toad. The western toad (*Bufo boreas*) occurs from the Rocky Mountains west to the Pacific Coast in a variety of natural habitats, such as desert streams, springs, seeps, grasslands, wooded areas, and mountain meadows. This species is mostly terrestrial, but it prefers to be near wet areas and most commonly occurs around marshes and small lakes, especially during breeding. During daylight hours, adult toads typically remain underground or in sheltered areas (Yeo and Peterson 1998). Western toads eat insects. They hibernate during winter months. There are several known occurrences of this Forest Service sensitive species on the S-CNF (see Appendix H).

Long-toed Salamander. This species (*Ambystoma macrodactylum*) occurs from southeastern Alaska to central California. In the Intermountain Region, it occurs as far east as the S-CNF. This salamander has a wide habitat breadth from semi-arid sagebrush-steppe to alpine meadows and high mountain lakes. It occurs at elevations ranging from sea level to 10,000 feet. It is usually found under logs, rocks, or other debris near water. The adults are subterranean except during the breeding season. In cold areas, the larvae may over-winter before transformation (Nussbaum et al. 1983). There are several known occurrences of this sensitive species on the S-CNF (see Appendix H).

d. Introduced Salmonids

Non-native salmonids have been introduced on the S-CNF since the late nineteenth century to enhance angling opportunities. Arctic grayling (*Thymallus arcticus*), golden trout (*Oncorhynchus aguabonita*), and lake trout (*Salvelinus namaycush*) have been introduced to the S-CNF to enhance angling opportunities in high mountain lakes. Brook trout (*Salvelinus fontinalis)* and rainbow trout (*O. mykiss)* have also been introduced to S-CNF lakes and streams. Although they have strong populations within the S-CNF, the latter two introduced salmonids pose risks of hybridization with native salmonids and compete for food and space.

e. Recreational Fisheries and Nongame Species

Although most fisheries surveys focus on the occurrence of species that are endangered, threatened, sensitive, or of concern (species listed under the ESA plus those so designated by the Forest Service and State of Idaho), a number of fish species provide recreational opportunities on the S-CNF. These include hatchery stocks of chinook salmon and steelhead, and rainbow trout, redband trout, brook trout, golden trout, Arctic grayling, lake trout, and mountain whitefish (*Prosopium williamsoni*). Hatchery-spawned, non-ESA steelhead that return to the Salmon River Basin as adults support a broad recreational fishing base within the basin, including areas within the S-CNF (Quigley and Arbelbide 1997).

Numerous S-CNF watershed analyses and sub-basin reviews prepared by the Forest Service, as well as the Idaho Fish and Game (IDFG 2001) Fisheries Management Plan for 2001 – 2006, reflect the importance, value, and widespread popularity of recreational fisheries on rivers, streams, and lakes throughout all Ranger Districts of the S-CNF. Drainages described in the IDFG Fisheries Management Plan that are contained entirely or in part within the S-CNF boundaries are the: Salmon River Drainage (Horse Creek to North Fork, North Fork to Headwaters, Middle Fork, East Fork, and Yankee Fork); Lemhi River Drainage; Pahsimeroi River Drainage; and the Sinks Drainages (Big Lost and Little Lost

Rivers, and Birch, Medicine Lodge, and Camas Creeks). Depending on the drainage and water body, fisheries on the S-CNF are managed for wild trout, put-and-take trout, a quality fishery, a trophy fishery, species conservation/preservation, and/or anadromous species.

Examples of commonly occurring nongame fish species that are important members of aquatic communities on the S-CNF include redshine shiner (*Richarsonius balteatus*), sculpin (*Cottus spp.)*, longnose sucker (*Catostomus catostomus*), and northern pikeminnow (*Ptychocheilus oregonensis*). These species, as well as all other fish species described above, may occur in habitats adjacent to areas that have been invaded by weeds or are potentially vulnerable to weed invasion. These stream and lake habitats could potentially be affected by the presence of noxious weeds and/or land management practices associated with noxious weed control.

f. Aquatic Management Indicator Species

Management Indicator Species (MIS) on the S-CNF are considered to be key species that represent life forms and have habitat requirements similar to other groups of plants or animals on the S-CNF. MIS are selected to represent special habitats, major habitat components of the S-CNF, economically or socially important species, ecological indicators, and monitoring capability. Aquatic MIS for the S-CNF consist of two anadromous and three resident fish species addressed previously (chinook salmon, steelhead, bull trout, Westslope cutthroat trout, and rainbow trout) that require high-quality habitat, and six taxonomic groups of aquatic macroinvertebrates (U.S. Forest Service 1987a; 1988a). The macroinvertebrates include three genera of mayflys (*Rhithrogena* spp., *Epeorus* spp., and *Ephemerella doddsi*) whose abundance indicates high water quality; one genera of stonefly (*Zapada* spp.) whose abundance generally indicates healthy riparian zones; one species of mayfly (*Ephemerella inermis*) whose abundance may indicate increased sedimentation; and members of the family Chironomidae (midges) whose abundance may indicate habitat degradation.

3.C.3. Wildlife Resources

a. Habitat Conditions and Threats

The S-CNF hosts a wide variety of wildlife, primarily resulting from the diversity of habitats and climatic variations. Public lands on the S-CNF provide year-round habitat for large ungulates like elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), bighorn sheep (*Ovis canadensis*), mountain goats (*Oreamnos americanus*), pronghorn antelope (*Antilocarpa americana*), and moose (*Alces alces*). Predators like mountain lions (*Felis concolor*), black bears (*Ursus americanus*), coyotes (*Canis latrans*), and gray wolves (*Canis lupus*) also roam the S-CNF. Upland game birds are also present on the S-CNF. Wetlands and riparian-dependent species are present in the lower valleys; beaver, amphibians, and wading birds use these areas. Many species of migratory birds spend vital nesting/reproduction time on the S-CNF.

Noxious weed invasion has affected to some extent the following habitats:

- The sagebrush/grass series supports the large ungulates (especially during winter as key winter range) and game birds like chukar (*Alectoris chukar*) and sage grouse. This habitat also plays an important role in the reproductive success of large ungulates,

especially of ewe/lamb bands in more rocky portions of the S-CNF. Road densities in this habitat are high, and generally contribute to a higher occurrence of noxious weeds. Private agricultural developments have converted portions of these grasslands to irrigated pastures and fields, reducing native habitat and increasing the probability of noxious weed invasion.

- Low-elevation ponderosa pine and Douglas-fir communities form a major portion of the S-CNF available as big game winter forage. Perennial grasses, forbs, and shrubs form a major part of this forage, and are more vulnerable to weed invasions. Blue grouse (*Dendragpus obscurus*) prefer the pine communities for nesting and spring/summer forage. These habitat communities also provide important elk and deer birthing and rearing areas. Black bear use the habitat for forage. These pine communities provide vital habitat for a diverse array of small mammals and birds ranging from American marten (*Martes americana*) to raptors. Road density and recreational use in these communities are high, contributing to the spread of noxious weeds.

- Riparian communities provide habitat for various wildlife species ranging from nesting songbirds to elk cow/calf summering bands. These communities provide structural diversity, particularly when interspersed within pine and grassland communities. Their occurrence at most elevations within the S-CNF provides essential vertical diversity. Big game, beaver, waterfowl, amphibians, and wading birds all rely on this habitat type. The ecological importance and vulnerability of these communities cannot be overstated. Noxious weeds spread aggressively in such areas.

Wildlife habitats, such as alpine meadows and cold forest types such as Douglas-fir-, lodgepole pine, and white bark pine, also occur in higher elevations of the S-CNF, but they are not as vulnerable to noxious weed invasions. Roadless areas of the S-CNF extend throughout all habitats, but are less vulnerable to the spread of noxious weeds due to minimal access opportunities and nominal ground disturbance.

b. Special Status Species: Federally Listed Wildlife

The USFWS initially provided a list of nine threatened, endangered, and candidate fish and wildlife species that may spend all or part of each year on the S-CNF. These species are given special consideration and protection under Section 7(c) of the ESA of 1973. The USFWS provided subsequent consultation (see Appendix G) stating that one of the five wildlife species, grizzly bear, is no longer listed as threatened on the S-CNF. This section reviews the habitat requirements and distribution of the four federally protected terrestrial wildlife species listed in Table 3-9. Appendix H presents information on their distribution on the S-CNF by Ranger District and HUCs 4 and 5. The four federally protected fish species were reviewed in *Section 3.C.2, Aquatic Resources*. These lists are subject to change as species are added, removed, or recategorized.

Bald Eagle. This species was federally listed as threatened on March 11, 1967. This species' status was reclassified from endangered to threatened because of recovery progress on July 12, 1995. Bald eagles (*Haliaeetus leucocephalus*) are closely associated with lakes and large rivers in open areas, forests, and mountains. They nest near open water in late-successional forest with many perches or nest sites, and low levels of human disturbance (McGarigal 1988; Wright and Escano 1986). The nest site is usually within one quarter to 1 mile of open

water with less than five percent of the shore developed within 1 mile. Perches are generally at the edge of forest stands, near foraging areas, or near the nest tree and have panoramic views of surrounding areas. Bald eagles need large trees along rivers with good visibility, preferably snags, but also use trees or boulders for perching. Protected deep ravines with large trees are often used as night roosts. The food base is largely aquatic species (fish) and riparian/wetland dwelling birds. Carrion and small terrestrial mammals are also utilized.

Critical winter habitat is near food sources, such as lakes, rivers, and uplands with big game winter range. These sites have adequate perch sites and sheltered roost sites. Human activity may be a major factor limiting bald eagle distribution in wintering habitats (Steenhof 1976).

Yellow-billed cuckoo. In July 2001, the USFWS announced a 12-month finding for a petition to list the yellow-billed cuckoo (*Coccyzus americanus*) as threatened or endangered in the western U.S. A petition to list this species was filed in 1998. The petitioners stated that "habitat loss, overgrazing, tamarisk invasion of riparian areas, river management, logging, and pesticides have caused declines in yellow-billed cuckoo." In the 90-day finding published on February 17, 2000 (Federal Register 65[33]: 8104-8107), the USFWS indicated that these factors may have caused loss, degradation, and fragmentation of riparian habitat in the western U.S., and that loss of wintering habitat may be affecting the cuckoo. The yellow-billed cuckoo is a candidate species for protection under the ESA.

This secretive bird is a neotropical species that breeds in North America and winters primarily south of the U.S.-Mexico border. It once flourished in western cottonwood and willow riparian forests and thickets, but is now nearly extinct west of the Continental Divide, where it has disappeared from large portions of its former range and is extremely rare in the interior West. Most Idaho records are of isolated, non-breeding individuals (USFWS 1985). Although occasional reports of this bird are noted, including several birds at Lawyers Creek in Lewis County in 1979 and six at the Cartier Wildlife Management Area in 1980, and an observation of a single adult bird made south of Challis, Idaho along the Salmon River in 1998, no nesting attempts or young have been observed and breeding populations of yellow-billed cuckoos in Idaho are believed to be extirpated (Reese and Melquist 1985).

This species may go unnoticed because it is slow-moving and prefers dense vegetation. In the West, it favors areas with a dense understory of willow (*Salix* spp.) combined with mature cottonwoods, generally within 100 meters of slow or standing water (Gaines 1974; Gaines 1977; Gaines and Laymon 1984). The yellow-billed cuckoo is also known to use non-riparian, dense vegetation such as wooded parks, cemeteries, farmsteads, tree islands, Great Basin shrub-steppe, and high elevation willow thickets (Finch 1992; DeGraaf et al. 1991). It feeds on insects, mostly caterpillars, but also beetles, fall webworms, cicadas, and fruit (especially berries). Populations seem to fluctuate dramatically in response to fluctuations in caterpillar abundance. These fluctuations are erratic, but not necessarily cyclic (Kingery 1981).

Gray Wolf. This species was federally listed as endangered on March 11, 1967. The wolf was considered extirpated from the western portion of the conterminous U.S. by about 1930. The gray wolf (*Canis lupus)* historically ranged over most of North America north of Mexico City, except for the southeastern U.S. The gray wolf occurred historically in the northern

Rocky Mountains, including mountainous portions of Wyoming, Montana, and Idaho. For 50 years prior to 1986, no detection of wolf reproduction was found in the Rocky Mountain portion of the U.S. Reproducing wolf populations were not known to occur in Idaho. Wolves were occasionally sighted in Idaho, but did not constitute a population as defined by scientific experts (USFWS 1994). On November 18, 1994, the USFWS announced that "experimental non-essential" populations of this species would be reintroduced in central Idaho and southwestern Montana. Populations classified as "experimental non-essential" are exempt from full endangered status (USFWS 1994). This status designation allows for "flexible management" options for this species in areas allocated for reintroductions.

The gray wolf has no particular habitat preference, but requires areas with low human population, low road density, and high prey density, which are ideally large, wild ungulates (Burt and Grossenheider 1980; Bjorge and Gunson 1989; Fisher et al. 1998; Mech 1989).

There are three recovery areas designated by the USFWS: the Northwestern Montana Recovery Area, the Greater Yellowstone Recovery Area, and the Central Idaho Recovery Area. The Central Idaho Recovery Area wolf population is managed and monitored by the Nez Perce Tribe. In January, 1995, 15 animals were released and in January, 1996, 20 more were released in the FCRONRW. Several on-going research projects in or near the S-CNF are looking at wolf-cougar and wolf-livestock interactions. These introduced wolves have established several viable packs throughout the S-CNF, except in the Lost River and Leadore Ranger Districts.

TABLE 3-9
Endangered, Threatened, and Candidate Wildlife Species Under the ESA that may Potentially Occur within the S-CNF[1]

Common Name	Scientific Name	Habitat	Federal Status
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	Relative solitude, late-successional forests, shorelines adjacent to open water, a large prey base for successful brood rearing, and large, mature trees for nesting and resting.	T
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	Riparian woodlands, thickets, and farms.	C
Mammals			
Gray wolf	*Canis lupus*	Adapted to many habitats, need large ungulate prey base and freedom from human influence.	E/XN
Canada lynx	*Felis lynx canadensis*	Requires foraging habitat, denning sites, and dispersal and travel cover.	T

T = threatened
C = candidate
E/XN = Endangered/ experimental, non-essential population
[1]These lists are subject to change as species are added, removed, or recategorized.

Canada Lynx. The Canada lynx (*Felis lynx canadensis*) was federally listed as threatened on March 24, 2000. In the contiguous U.S., the distribution of lynx is associated with the southern boreal forest, consisting of subalpine coniferous forest in the West and primarily

mixed coniferous/deciduous forest in the East (Aubry et al. 1999). In Canada and Alaska, lynx habitat is the classic boreal forest ecosystem known as the taiga (McCord and Cardoza 1982; Quinn and Parker 1987; Ruggiero et al. 1999). Within these general forest types, lynx are most likely to persist in areas that receive deep snow, for which the lynx is highly adapted (Ruggiero et al. 1999).

According to the Forest Service (1993), lynx in the southern extension of their range require three primary habitat components: 1) foraging habitat (15- to 35-year-old lodgepole pine to support snowshoe hare, the primary food source, and provide hunting cover; 2) denning sites with patches of spruce and fir greater than 200 years old that provide abundant large woody debris; and 3) dispersal and travel cover that is variable in vegetative composition and structure. Abundance of snowshoe hare is the limiting factor for lynx (Koehler 1990; Reichel et al. 1992). Snowshoe hare distribution is limited by the availability of winter habitat that includes early successional lodgepole pine with trees that exceed the mean snow depths and provide snow interception and are interlocking canopy above the snow. Lynx dens are primarily located in mature lodgepole pine and spruce-fir forests (Koehler and Brittell 1990).

When the Canada lynx was federally listed as threatened, the USFWS concluded that the chief threat to the lynx in the contiguous U.S. was the "lack of guidance to conserve the species" in federal land management plans. In February 2000, the Forest Service and USFWS signed a Lynx Conservation Agreement to implement the management standards contained in the Lynx Conservation Assessment Strategy (LCAS) and thus to promote the conservation of lynx and its habitat. The LCAS was prepared by a group of inter-agency biologists and provides detailed descriptions of lynx habitat, potential risk factors affecting lynx, and potential conservation measures. The Forest Service and BLM are jointly preparing an EIS on a proposal to implement management direction contained in the LCAS for Canada lynx habitat on national forests and BLM units within the Northern Rocky Mountain area. The proposal would amend 18 land and resource management plans for national forests in Idaho, Montana, Utah, and Wyoming, and 18 BLM land use plans in Idaho and Utah.

c. Other Sensitive Wildlife Species

In addition to the federally listed species described above, the Forest Service Region 4 sensitive wildlife species list includes: spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii)*, fisher (*Martes pennanti*), wolverine (*Gulo gulo*), boreal owl (*Aegolius funereus*), flammulated owl (*Otus flammeolus*), great gray owl (*Strix nebulosa*), northern goshawk (*Accipiter gentilis*), three-toed woodpecker (*Picoides tridactylus*), harlequin duck (*Histrionicus histrionicus*), and peregrine falcon (*Falco peregrinus*). The two other Forest Service sensitive species occurring on the S-CNF—Westslope cutthroat trout and Columbia spotted frog—were discussed under *Section 3.C.2, Aquatic Resources*. Although not a Forest Service Region 4 sensitive species, sage grouse (*Centrocercus urophasianus)* are also discussed in the following text because of their severely declining numbers in the Intermountain West. Appendix H presents information on the locations of these species on the S-CNF by Ranger District and HUCs 4 and 5. These lists are subject to change as species are added, removed, or recategorized.

Spotted Bat. The spotted bat is very uncommon in central Idaho, but is distributed across a wide range of habitats in the western mountain region from desert scrub to open ponderosa pine forests. This species usually occurs in rough, rocky, semi-arid to arid landscapes and roosts in cliff faces and rock crevices (Genter and Jurist 1995). This species is solitary in nature, and the female bears one young each year in late spring. Its diet consists almost exclusively of medium-sized moths, beetles, and caddisflies. Foraging has been observed in forest openings, particularly ponderosa pine forests, pinyon juniper woodlands, large riverine/riparian habitats, riparian habitat associated with small to mid-sized streams in narrow canyons, wetlands, meadows, and old agricultural fields. In Idaho, populations occur in the central and southwestern corner of the state (Doering and Keller 1998; Wenger, personal communication). One unvouchered record for the Salmon River in Nez Perce County exists, and a juvenile was caught and released during a mist net survey in the Middle Fork of the Salmon River in 1998. Two vouchered specimens have been collected in Idaho; the remaining records are from acoustic recordings.

Townsend's Big-eared Bat. This bat inhabits a variety of habitats from desert shrub to deciduous and coniferous forests at a wide range of elevations. In Idaho, some individuals likely migrate to hibernal sites to overwinter and disperse to forested areas during summer when the sexes separate (Pierson et al. 1999). Other individuals found near Lake Pend Oreille seem to use the same mine during both summer and winter. In Lemhi County, this species has been captured in numerous mist net and harp trap surveys of abandoned mine adits. Hollow cavities in large trees or snags may constitute an important undocumented resource for maternity colonies of this species. Their diet consists mainly of moths in the family Noctuidae with lesser amounts of beetles, flies, and other insects.

Fisher. In the Pacific Northwest, the distribution of this species coincides with the habitat occupied by snowshoe hares, especially Douglas-fir forests. Fishers are generalized predators that eat a wide variety of birds, mammals, fruit, and carrion. The fisher is known as a predator of porcupines, but snowshoe hares are the most common prey (Ingles 1965; Powell and Zielinski 1994). Fishers avoid non-forested areas, especially in winter (Coulter 1966; Earle 1978; Jones 1991; Jones and Garton 1994; Kelly 1977). In the S-CNF, this species has been noted in the Pistol Lake area and the North Fork of the Salmon River drainage.

Wolverine. This rare mammal is distributed circumpolarly from the 38th parallel north, with populations in the Colorado Rocky Mountains and California Sierra Nevada dropping below this latitude (Banci 1994). This species (*Gulo gulo*) feeds on small animals, snowshoe hare, porcupines, and marmots, as well as on carrion. They are found in inaccessible areas of mountain ranges in central Idaho and are believed to be distributed mainly in the Selkirk Mountains and the Sawtooth Mountain-Smokey Mountain complex (Groves 1988), but are also known to occur in the Salmon River Mountains and the Beaverhead Mountains.

Boreal Owl. This owl inhabits spruce-fir forests in Montana, Idaho, and northern Wyoming (Hayward et al. 1993). They require cavities for nesting and feed primarily on small mammals, especially southern red-backed voles (*Clethrionomys gapperi*). Spruce-fir is the preferred species but cavities have been found in Douglas-fir, lodgepole, aspen, and high elevation ponderosa pine (Hayward and Verner 1994). Boreal owls inhabit mature and older forest stands and need forest management and timber harvest systems that will retain snags and forest structure. Boreal owls are present within the North Fork and Salmon/Cobalt Ranger Districts.

Flammulated Owl. This tiny, insectivorous owl is a neotropical migrant that breeds in the mountains of the western U.S. and winters in the Southwest U.S., Mexico, and Central America. Summer breeding sites are mainly in ponderosa pine and Jeffrey pine (*Pinus jeffreyi*) (Verner 1994). Preferred nesting sites are in forests with old ponderosa pine mixed with Douglas-fir (Linkhart et al. 1998). This owl is known to breed in several areas on the S-CNF in mature ponderosa pine and Douglas-fir forest.

Great Gray Owl. This owl builds open nests in large trees in heavy forest canopy (Bull and Henjum 1990). They forage in more open forest sites with heavy grass ground cover, where they perch in snags or live trees to hunt. They prey upon relatively small prey, mostly small rodents such as voles (*Microtus* spp.) (Duncan and Hayward 1994). This owl has been found at higher elevations throughout the S-CNF.

Northern Goshawk. This accipiter is a forest habitat generalist that uses a variety of forest types, ages, structural conditions, and successional stages. It feeds on birds and small mammals (Johnsgaard 1990; Reynolds et al. 1992). During nesting, goshawks select mature forest consisting of a combination of old, tall trees with intermediate canopy coverage and small open areas within the forest for foraging. This species occurs in many areas on the S-CNF, such as the Salmon River Mountains and the Lemhi Mountains.

Three-toed Woodpecker. This woodpecker eats predominantly insects. Approximately 75 percent of its diet is insects such as wood-boring beetles, grubs, weevils, ants, other beetles, and spiders. Besides insects, it also feeds on berries and other small fruits, acorns, and nuts (Stokes and Stokes 1996). It often forages on fire-killed trees for insects (Hutto 1995). Post-fire conditions are important to this species for both feeding and nesting purposes. This species is known to utilize burned areas across the S-CNF.

Harlequin Duck. This sea duck, which winters along both coasts, breeds along inland streams. On the West coast, this species breeds and summers inland from the coastal mountains of Alaska to California, and along the northern Rocky Mountains to Yellowstone (Bellrose 1980). This riparian species prefers stretches of streams with mature and old growth forests. Aquatic insect larvae are the preferred diet for juveniles and for adults during the breeding season (Cassirer and Groves 1994). In Idaho, nest sites include cavities in trees and cliff faces (Cassirer et al. 1993). Adult females show fidelity to nest sites, but radio-tagged harlequins have used new nest sites after a nest failure the previous year (Cassirer et al. 1993; Wallen and Groves 1989). This species is only known to occur on the S-CNF during seasonal migrations.

Peregrine Falcon. Populations of this bird were considered to have sufficiently recovered so that the USFWS removed it from the Endangered Species List on August 20, 1999. This falcon feeds on a variety of smaller birds, often associated with riparian habitats, that are usually captured on-the-wing. This species nests mainly on cliffs, rarely in trees, and usually near water. Breeding peregrine falcons are most likely to be disturbed by activities taking place near their nest (Herbert and Herbert 1969; Ellis 1982). This species is known to nest in Lemhi County but not on the S-CNF.

Sage grouse. Sage grouse (*Centrocercus urophasianus)* are linked to sagebrush habitats. They prefer relatively tall sagebrush for nesting areas and open sites for lekking areas. Hens usually nest near the lekking grounds, but some are known to move as far as 20 miles to

preferred nesting and brood-rearing sites (Call 1979). Studies indicate preferred nesting and brooding sites have a selection of native forbs and grasses in the understory as well as a sagebrush overstory (Barnett 1993; Barnett and Crawford 1994; Connelly et al. 1991; Drut et al. 1994a; Drut et al. 1994b; Gregg 1992; Gregg et al. 1993; Ramsey et al. 1994). A special habitat feature for sage grouse during the brood-rearing period is riparian vegetation, especially wet meadows with forbs. Native forbs provide spring and summer food for hens and broods (Autenreith et al. 1982; Call 1979; Oakleaf 1971; Peterson 1970; Robertsons 1986; Savage 1969; Wallestad et al. 1975).

The dependence of sage grouse on sagebrush for winter habitat has been well documented (Eng and Schladweiler 1972; Beck 1975; Beck 1977; Robertson 1991). Similarly, the relationship between sagebrush habitats and sage grouse nest success has been described thoroughly (Klebenow 1969, Wallestad and Pyrah 1974, Wakkinen 1990, Connelly et al. 1991, Gregg et al. 1994). Populations may have: 1) distinct winter, breeding, and summer areas; 2) distinct summer areas and integrated winter and breeding areas; 3) distinct winter areas and integrated breeding and summer areas; or 4) well-integrated seasonal habitats (non-migratory populations). Seasonal movements between distinct seasonal ranges may exceed 75 km (Dalke et al. 1963, Connelly et al. 1988). Sage grouse tend to winter in low to mid-elevational, relatively flat, sagebrush areas (Eng and Schladweiler 1972; Rogers 1964). There are no known lekking grounds on the S-CNF, but there are areas of potential nesting and brood rearing habitat, although no confirmed sites. Observations of adult sage grouse, either singly or in small flocks, are common occurrences in the late fall and winter on the S-CNF.

d. Wildlife Management Indicator Species (MIS) Minimum Viable Populations and Anticipated Area of Suitable Habitat

Wildlife MIS on the S-CNF consist of 20 species, represented by four big game, two small mammal, eight songbird, two raptor, and four threatened, endangered, or sensitive wildlife species (U.S. Forest Service 1987a; 1988a). Some of these species were addressed previously, including bald eagle, gray wolf, grizzly bear, northern goshawk, great gray owl, and peregrine falcon. Other wildlife MIS on the S-CNF include elk, mule deer, bighorn sheep, mountain goat (*Oreamnos americanus*), American marten, pileated woodpecker (*Dryocopus pileatus*), vesper sparrow (*Pooecetes gramineus*), yellow warbler (*Dendroica petechia*), ruby-crowned kinglet (*Regulus calendula*), yellow-bellied sapsucker (*Sphyrapicus nuchalis)*, pygmy nuthatch (*Sitta pygmaea*), brown creeper (*Certhia americana*), mountain bluebird (*Sialia currucoides*), and red squirrel (*Tamiasciurus hudsonicus*). The mountain bluebird and red squirrel were not specifically addressed by Wisdom et al. (2000) as broad-scale species of focus. They have been added to and discussed below with wildlife groups 29 and 6, respectively, based on their habitat preferences.

1) MIS Minimum Viable Population and Habitat Requirements. The Forest Service (1987a) reported that existing populations and habitat required for each MIS wildlife species exceeded minimum viable levels, with the following exceptions. Mountain goat and yellow-bellied sapsucker were at minimum viable levels, and at that time bald eagle, peregrine falcon, gray wolf, and grizzly bear populations were at less than viable levels. These and other S-CNF wildlife species are discussed in the following text.

Existing data from the Salmon National Forest Land and Resource Management Plan (Salmon Plan) (U. S. Forest Service 1988a) were used to estimate the minimum viable populations (MVP) and the corresponding areas of required suitable habitat for MIS on the former Salmon National Forest portion of the S-CNF (Table 3-10). The Salmon Plan includes estimates for MVPs and the area of suitable habitat required to support these MVP levels on the entire Salmon National Forest, including the FCRONRW. The Salmon Plan also includes estimates of the amount of suitable habitat present for each MIS within the Salmon National Forest. These numbers have been adjusted downward by 26 percent in Table 3-10, equal to the portion of the Salmon National Forest within the FCRONRW, because this Final EIS does not cover the wilderness. A blanket reduction in these estimates proportional to the portion of the Forest that is within the wilderness and not considered in this Final EIS requires an assumption that the relative amount of suitable habitat for each MIS is similar on both the wilderness and non-wilderness portions of the Forest. Given the juxtaposition of the wilderness and non-wilderness and the similar range of elevations, this appears to be a reasonable assumption.

Specific approaches used by the USFS to estimate MIS populations and the corresponding areas of required suitable habitat in the Salmon Plan are described below. The text regarding species is taken directly from the Salmon Plan and refers to 1988 MVP and required habitat levels:

Big Game

These levels are considered to be minimum numbers that the population could be reduced to yet still not permanently alter the distribution pattern or gene pool. With the exception of mountain goats, this level ranges from approximately one-quarter to one-third of the existing level. Mountain goat populations are at approximately this level now (1988).

T&E Species

These are theoretical minimum levels needed to bolster existing populations to a level where they could be self sustaining on the Salmon National Forest. The existing (1988) situation for all species is below MVP levels.

Other Species

(MVP) Population levels were judged to be met by maintenance of minimum levels of major critical habitat, i.e., old growth timber, quaking aspen, sagebrush, and riparian zones, as well as minimum snag levels.

2) Estimated 1988 Population Levels and Areas of Suitable Habitat for MIS. The Salmon Plan also presented estimates of MIS populations and areas of suitable habitat on the entire former Salmon National Forest as of 1988. As above, these Forest-wide estimates have been revised downward by 26 percent to account for the fact that the FCRONRW is not considered in this Final EIS and the same assumptions apply. The revised MIS population and habitat estimates are also presented in Table 3-10. Specific approaches used by the USFS to estimate MIS populations and suitable habitat in the Salmon Plan is described below. The text regarding species is taken directly from the Salmon Plan and refers to 1988 population levels and habitat area:

Big Game

Existing population levels are sustained by available forage from National Forest and BLM winter range, and from National Forest summer range (both Salmon National Forest and adjacent National Forests). This includes existing (1988) levels of wildlife and livestock competition, and existing levels of open roads.

T&E Species

The existing (1988) levels are estimates of numbers felt to be occupying the Forest. This is considered to be below MVP for all species.

Other Species

Existing (1988) levels are estimates of animals actually present on the Salmon National Forest, based on local data where available, or the most reliable research from similar areas.

3) Anticipated Acres of Suitable Habitat for MIS Species on the S-CNF. The Land and Resource Management Plan for the Challis National Forest (U. S. Forest Service 1987c) includes estimates of the acres of suitable habitat for the four MIS (all big game species) on the Challis portion of the S-CNF. These estimates for elk, mule deer, bighorn sheep, and mountain goats have been adjusted downward because the FCRONRW is not considered in this Final EIS, and then added to the acres of anticipated suitable habitat on the Salmon National Forest to obtain an overall estimate of acres of suitable habitat for these four MIS on the S-CNF (Table 3-10, last column). The rest of the S-CNF MIS listed in Table 3-10 were not MIS for the former Challis National Forest.

Table 3-10 also notes the source habitats required by all of the S-CNF MIS, as described by Wisdom et al. (2000), and indicates the broad PVGs that likely include each of the source habitats. However, there are no direct correlations between source habitats and potential vegetation groups because source habitats are very specific while potential vegetation groups are very broad. Therefore, it is not possible to directly estimate the number of acres of suitable source habitats for the other MIS on the former Challis National Forest portion of the S-CNF based on acres of the potential vegetation groups present, which are the only available data.

Estimates of the number of acres of suitable habitat for each of the S-CNF MIS, besides the four big game species, were derived as follows. The former Salmon and Challis National Forests are both located within the Central Idaho Mountains Ecological Reporting Unit (ERU) as defined by Wisdom et al. (2000). ERUs are subdivisions of the Interior Columbia Basin Ecosystem Management Project area constructed to facilitate common reporting of ecological assessment results at a broad level. Areas within a particular ERU are assumed to be similar in terms of the types of source habitats present for specific wildlife species. Given their inclusion within a single ERU and the juxtaposition and the similar range of elevations of the lands within the former Salmon and Challis National Forests, it was assumed that the two Forests included similar source habitats and that the relative amount of each source habitat was similar on the two Forests. For example, the source habitat for the ruby-crowned kinglet was estimated to represent 12 percent of the area of the Salmon National Forest (U. S. Forest Service 1988a). Therefore, it was assumed that 12 percent of the Challis National Forest outside of the FCRONRW also was suitable ruby-crowned kinglet habitat.

Estimates of the area of suitable habitat for the remaining MIS for the Salmon and Challis National Forests were then combined and reported in Table 3-10.

TABLE 3-10
Management Indicator Species Estimated Minimum Viable Populations (MVP) and 1988 Population Levels on the Former Salmon National Forest and Anticipated Acres of Suitable Habitat on the S-CNF, excluding the FCRONRW.

Management Indicator Species	Estimated MVP on SNF and Required Habitat Acres (nearest 100 ac)[1]	Estimated Population and Acres of Suitable Habitat on SNF in 1988 (nearest 100 ac)[1]	Source Habitat Type	Potential Vegetation Groups	Anticipated Acres of Suitable Habitat on the S-CNF
Elk	1,110 (784,400 ac)	4,070 (1,307,600 ac)	Forest / range mosaic	All PVGs on S-CNF (see Table 3-13)	1,780,264
Mule deer	3,700 (740,000 ac)	16,058 (1,307,600 ac)	Forest / range mosaic	All PVGs on S-CNF(see Table 3-13)	2,092,857
Bighorn sheep	241 (185,000 ac)	740 (360,00 ac)	Forest / range mosaic	All PVGs on S-CNF(see Table 3-13)	672,283
Mountain goat	222 (227,200 ac)	222 (227,200 ac)	Forest / range mosaic	All PVGs on S-CNF(see Table 3-13)	347,249
American marten	148 (74,000 ac)	444 (142,100 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine, cold forest – Douglas fir, lodgepole, spruce and subalpine fir	330,934
Pileated woodpecker	34 (27,400 ac)	127 (103,600 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	241,306
Vesper sparrow	1,184 (29,600 ac)	2,812 (140,600 ac)	Range, early and late forest	Dry forest – Douglas fir and ponderosa pine, cool shrub, dry shrub	327,487
Yellow warbler	1,480 (6500 ac)	7,400 (31,800 ac)	Forest, woodland sagebrush	Dry forest – Douglas fir and ponderosa pine, woodland, dry shrub	74,115
Ruby-crowned kinglet	19,000 (27,400 ac)	111,000 (159,100 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	370,577
Northern goshawk	37 (102,100 ac)	53 (140,600 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	327,487
Great gray owl	22 (37,000 ac)	44 (74,000 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	172,362

TABLE 3-10
Management Indicator Species Estimated Minimum Viable Populations (MVP) and 1988 Population Levels on the Former Salmon National Forest and Anticipated Acres of Suitable Habitat on the S-CNF, excluding the FCRONRW.

Management Indicator Species	Estimated MVP on SNF and Required Habitat Acres (nearest 100 ac)[1]	Estimated Population and Acres of Suitable Habitat on SNF in 1988 (nearest 100 ac)[1]	Source Habitat Type	Potential Vegetation Groups	Anticipated Acres of Suitable Habitat on the S-CNF
Yellow-bellied sapsucker	355 (1800 ac)	355 (1,800 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	4,137
Pygmy nuthatch	2,812 (2800 ac)	6,600 (6,700 ac)	Low elevation old forest	Dry forest – Douglas fir and ponderosa pine	15,513
Brown creeper	1,332 (13,300ac)	6,600 (66,600 ac)	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	155,125
Red squirrel[2]	Unknown	Unknown	Broad elevation old forest	Dry forest – Douglas fir and ponderosa pine	370,577[a]
Mountain bluebird	1,480 (29,600 ac)	7,4000 (148,000 ac)	Range, early and late forest	Dry forest – Douglas fir and ponderosa pine, cool shrub, dry shrub	344,723
Bald eagle	3 (11,800 ac)	## (11,800 ac)	Forest, woodland sagebrush	Dry forest – Douglas fir and ponderosa pine, woodland, dry shrub	27,578
Peregrine falcon	4 (111,000 ac)	0 (111,000 ac)	Forest, woodland sagebrush	Dry forest – Douglas fir and ponderosa pine, woodland, dry shrub	258,542
Gray wolf	7 (74,000 ac)	4 (74,000 ac)	Forest / range mosaic	All PVGs on S-CNF(see Table 3-13)	172,362
Grizzly bear[3]	(29,600 ac)	(29,600 ac)	Forest / range mosaic	All PVGs on S-CNF(see Table 3-13)	68,945

[1]Existing = 1988, the date of Salmon National Forest Land and Resource Management Plan publication
[2]The red squirrel was designated as an MIS on the former Challis NF. No estimates of MVP or suitable habitat were provided. Estimated suitable habitat on the S-CNF is based on estimated area of suitable habitat for the ruby-crowned kinglet, which occupies similar habitat.
[3]Grizzly Bear Recovery Plan does not involve recovery efforts on the Salmon NF, therefore MVP numbers are not included
##Bald eagle population trends are increasing on the Salmon NF from the 1988 levels. Bald eagles are known to nest and are frequently observed on the Salmon River.

e. Source Habitats–Families and Groups

This text describing source habitats, families, and groups is adapted from specialist's reports developed for the Gibbonsville Environmental Assessment (U.S. Forest Service 2002a).

Source habitats describe primary plant components and vegetation structural characteristics, which are a part of a species' overall set of environmental conditions that contribute to a stationary or positive population growth (Wisdom et al. 2000). Habitat characteristics include structural stage, vegetation cover type, and special habitat features such as snags, downed logs, or caves. Source groups are a collection of species that have similarities in source habitats; source families are a collection of groups of species that are used to describe project level habitat characteristics and evaluate management actions. There are 7 source habitat families evaluated for the S-CNF that represent "species of focus," those species for which there is ongoing concern about population or habitat status. In addition to source habitats, species of focus often have one or more legal or special management designations. There are four designations that apply to species in this document: federally listed threatened or endangered species, Regional Forester sensitive species, Forest Plan management indicator species, and Idaho high priority birds. Threatened or endangered species are officially designated by the USFWS as having their existence threatened over their entire range or localized area because of habitat loss or population declines. Experimental non-essential populations are officially designated by the USFWS as either threatened or endangered that are released as experimental populations outside their currently occupied range, but within probable historic habitat, to further species conservation. R4 sensitive species are selected because there is a concern for population numbers or habitat. MIS species are selected to evaluate the effects of the proposed management activities and are considered to be key species that represent a broad range of wildlife species and have habitat requirements similar to other groups of animals. Idaho high priority birds are birds that have been recognized by Idaho Partners in Flight as a concern due to declining trends in either habitat or populations.

1) **Population Status and Trends.** Population status and trends for birds data were obtained from the Partners in Flight Species Assessment Database (Partners in Flight 2002a). Much of this information was reported in the Gibbonsville Environmental Assessment (U.S. Forest Service 2002b) and includes relative abundance and interpretation of population trends. Mammal and amphibian population status and trends are available through the Natural Heritage Program and Conservation Data Centers data provided in *Atlas of Idaho's Wildlife* (Groves et al. 1997) and where available, individual species conservation plans. Local survey data were used where available for some bird species such as the northern goshawk and flammulated owls. Idaho Department of Fish and Game population data were used for elk and mule deer; and trapping records were used for furbearers where available. Population data are not available for some species.

Species accounts are found in several support documents, including the *Atlas of Idaho's Wildlife* (Groves et al. 1997) that provides species accounts and primary State references for all terrestrial species analyzed in this document. Most threatened, endangered, and sensitive species accounts are found in threatened, endangered, sensitive species of the Intermountain Region (U.S. Forest Service 1991b); and many of the bird species accounts are found in the Idaho Bird Conservation Plan (Partners in Flight 2000). Species with management or conservation plans include the bald eagle, northern goshawk, gray wolf, grizzly bear, and lynx. Species account references, if different than Groves (1997), are listed at the end of each family discussion. Tables 3-11 and 3-12- show the relative abundance and population trends for mammal and bird species, respectively, in the groups selected for

analysis in this Final EIS. Table 3-11 reflects trend data from the Idaho Department of Fish and Game's (IDFG) annual big game counts along with interpretations and conclusions from IDFG and S-CNF wildlife biologists (personal communication Dr. Tom Keegan IDFG, Salmon Region IDFG Wildlife Manager and Dick Wenger, Wildlife Biologist, S-CNF). Big game populations are managed by the IDFG. Habitat availability and condition are only two of several factors considered by IDFG in determining harvest levels and population goals. Big game population trends therefore may not directly reflect habitat conditions on the S-CNF. Populations are managed by IDFG to meet the goals established for specific Game Management Units. Therefore, some units may be increasing while others may be decreasing in population.

TABLE 3-11
Population status and trends for MIS Mammals on the S-CNF

MIS	Population Status	Population Trend
Gray wolf	Introduced experimental, non-essential population,	Stable to increasing
Grizzly bear[1]	Does not occur on the S-CNF	
Elk	Common	Stable to slight decrease
Mule deer	Relatively common	Stable to increasing
Bighorn sheep	Uncommon in suitable habitat	Stable but currently low (subject to disease from domestic sheep)
Pronghorn antelope	Relatively uncommon	Increasing
Mountain goat	Uncommon in suitable habitat	Decreasing
American marten	Common	Stable
Red sqiurrel	Common	Stable

[1]The grizzly bear recovery plan does not include recovery efforts on the S-CNF, and none are present.

TABLE 3-12
Bird Population Relative Abundance and Trends from Partners in Flight Database for Bird Conservation Region 10 (Rocky Mountains) and Physiographic Area 68 (Northern Rockies) for S-CNF Species of Focus

Species	Relative Abundance	Trend Interpretations Region 10 (Physiographic Area 68)
Pygmy Nuthatch	3	Stable
Northern Goshawk (summer)	5	Possible Decline
Northern Goshawk (winter)	5	Possible Decline
Flammulated Owl	5	No data
Pileated Woodpecker	4	Significant Increase
Brown Creeper	4	Significant Increase (Uncertain)
Ruby Crowned Kinglet	3	Stable (Moderate Decline)
Yellow-bellied Sapsucker	4	No data
Boreal Owl	5	No data
Great Gray Owl	5	No data
Three-toed Woodpecker	4	Uncertain
Bald Eagle	4	Significant Increase
Harlequjn Duck	3	No Data
Yellow Warbler	3	Moderate Decline (Stable)
Peregrine Falcon	5	Uncertain
Mountain Bluebird	3	Possible Increase (Significant Increase)
Vesper Sparrow	2	Stable
Greater Sage Grouse	3	Declining

Relative abundance is a measure of the component of vulnerability that reflects the abundance of breeding individuals of a species, within its range, relative to other species (premise that rare or uncommon are more vulnerable to decline or extinction than species that are more common)[avg # birds/BBS route].
[1] Highest relative abundance
[2] High
[3] Moderate
[4] Low
[5] Lowest

2) **Source Habitat Families.** The strategy of grouping species relative to their source habitats as presented by Wisdom et al. (2000) in their analysis of terrestrial vertebrates for the Interior Columbia Basin was used for this assessment. The 31 species in this analysis are organized into 9 families and 18 groups (Table 3-13).

Source habitat groups are composed of one or more species that share common source habitats as defined by vegetation cover types and structural stages (Table 3-14). Similar groups also are clustered into families whose source habitats generally fall into similar terrestrial community groups, a broader classification that includes several cover types.

Source habitat trends for the Central Idaho ERU (Table 3-15) are generally neutral for 7 of the 9 families described in this document (Wisdom et al. 2000). Declining trends in source habitat are reported for family 1 (low elevation, old forest family) and family 8 (rangeland and early- and late-seral forest family). Habitat decline is associated with changes from historic to current periods. The use of family level habitat trends is a coarse-filter approach and provides an understanding of changes at the broad-scale of the S-CNF. The approach used in this document, to group focal species by source habitats, is similar to the approach taken by Noss et al. 2001.

a) Family 1: Low Elevation, Old Forest Family—Group 1 – Pygmy nuthatch

Source Habitat and Special Habitat Features

The species in this family are associated with late seral single-layer ponderosa pine, and multi-layer Douglas-fir. Special features include large-diameter snags for foraging and nesting (Wisdom et al. 2000).

Broadscale-Columbia River Basin and the Central Idaho ERU

Basin-wide, 70 percent of the watersheds are reported as having a declining trend in source habitat for family 1 (Wisdom et al. 2000). The Central Idaho ERU is among the majority (11 of 13) of sub-basins with a declining trend in more than 50 percent of the watersheds within the sub-basin. Basin-wide decreases in source habitats are related to declines in old forest lower montane. Declines occurred in both late-seral single and late-seral multi-layer and were considered ecologically significant except for the old-forest multi-layered in the Central Idaho sub-basin (Hann et al. 1997). The decline in late-seral single-layered lower montane represents the strongest decline in source habitats for the basin noted by Wisdom et al. (2000).

S-CNF

Declines in late-seral single-layer lower montane for the S-CNF are similar to declines reported for the basin and Central Idaho ERU (Wisdom et al. 2000 and U.S. Forest Service 2002a). However, late-seral multi-layer trends for the S-CNF are of a greater magnitude than the ERU trend (U.S. Forest Service 2002a).

Pygmy nuthatch. The pygmy nuthatch is almost exclusively associated with lower montane ponderosa pine late-seral single- and multi-storied forests with fairly open canopies (Wisdom et al. 2000). Pygmy nuthatches require large-diameter (greater than 21 inches) snags or trees with cavities for nesting and foraging; since this species is a secondary cavity nester it can utilize a variety of nesting structures (McEllin 1979). This species has one of the most limited ranges of any species inhabiting the Salmon River drainages (Roberts 1992).

b) Family 2: Broad Elevation, Old Forest Family—Group 5 – Northern goshawk (summer habitat), flammulated owl, American marten, fisher; Group 6 –Pileated woodpecker, brown creeper, ruby crowned kinglet, yellow-bellied sapsucker (formerly grouped with the red-naped sapsucker), red squirrel; Group 7 – Boreal owl; Group 8 – Great gray owl; Group 11 – Three-toed woodpecker.

Source Habitat and Special Habitat Features

Species in family 2 use late-seral multi- and single-layered stages of the montane community (Wisdom et al. 2000). Similarities exist with family 1, but this family uses a mix

of cover types including lower elevation ponderosa pine and interior Douglas-fir. All of the species in this family except the ruby crowned kinglet depend on snags; several including the fisher, American marten, and pileated woodpecker, also depend on downed logs for foraging or nesting. Large hollow trees are also important to the pileated woodpecker and the boreal owl. Prey species for many species in this group depend on special features common in the late seral stages such as lichens and fungi.

Source habitats common to the Group 5 species include late seral stages of the montane community group and unmanaged young forests because these contain sufficient large-diameter snags and logs needed for various life functions of the species in this group. Source habitats for martens extend up into these same stages of subalpine forests. Martens are apparently more sensitive to vegetation patch size than other members of Group 5 and usually avoid clearcuts dominated by grasses, forbs, and saplings, especially in winter (Wisdom et al. 2000). Downed woody material is likely the key component of marten foraging areas (Coffin et al. 1997), providing habitat for many of their prey and subnivian (under the snow) access to prey during the winter. Fishers and martens also depend on down logs for resting and denning (Buskirk and Powell 1994; Raphael and Jones 1997).

Old forests consisting of ponderosa pine and Douglas-fir seem to be a key component of flammulated owl home ranges (Reynolds and Linkhart 1992). Variability in the structure of these old forest stands seems important to support life functions of flammulated owls with roosting occurring in fairly dense stands and foraging occurring in more open stands (Wisdom et al. 2000).

Source habitats for the species in Group 6 are generally late-seral stages of subalpine, montane, lower montane, and riparian woodland plant community groups (Wisdom et al. 2000). Large and smaller snags are important for nesting, roosting, and/or foraging.

Red squirrels require mature coniferous trees as a source of cones and seed (DeGraaf and Rudis 1986). The best cone production occurs in 200- to 300-year old Douglas-fir and 150- to 200-year-old Engelmann spruce. Large trees in a group closely spaced in 0.1 acre (0.04 ha) or less are favored. Females prefer to nest in natural tree cavities or abandoned woodpecker (Picidae) holes, tree hollows, or any other small crevice (DeGraaf and Rudis 1986).

Broadscale-Columbia River Basin and the Central Idaho ERU

Most watersheds (59 percent) showed a declining trend in source habitat for family 2 (Wisdom et al. 2000). The Central Idaho ERU was reported as having a neutral trend but among the group of sub-basins that had 43 percent or more of the watersheds in a declining trend. Basin-wide source habitat for most species in family 2 declined due to the decrease in ponderosa pine habitats. Exceptions were three-toed woodpecker source habitat, which increased, and great gray owl source habitat, which remained neutral because their source habitats are not ponderosa pine. Basin-wide declines in source habitat for family 2 are associated with timber harvest, fire exclusion and changes in insect and disease infestation cycles.

Declines in source habitats primarily occurred in late-seral lower montane single-layer forest, which was projected to have more than an 80 percent decline in spatial extent since historic period (Hann et al. 1997).

TABLE 3-13
Special Habitat Features and Source Habitats for S-CNF Weed EIS Species of Focus[a]; adapted from U.S. Forest Service 2002a and Wisdom et al. (2000)

			Cold Forest			Dry Forest															
			Spruce/Fir/Lodgepole			Ponderosa Pine				Douglas-Fir with Ponderosa Pine				Douglas-Fir without Ponderosa Pine				Douglas-Fir/Lodgepole Pine			
Fmly	Grp	Common Name	ES	MS	LSM	ES	MS	LSM	LSS	ES	MS	LSM	LSS	ES	MS	LSM	LSS	ES	MS	LSM	LSS
1	1	Pygmy Nuthatch							X			X	X								
1									X							X					
2	5	Northern Goshawk (summer)					X	X	X		X	X	X		X	X	X		X	X	X
2	5	Flammulated Owl					X	X	X		X	X	X		X	X	X				
2	5	American Marten		X	X						X	X	X		X	X	X		X	X	X
2	5	Fisher													X	X	X		X	X	X
								X	X			X	X			X	X				
2	6	Pileated Woodpecker						X	X			X	X			X	X				
2	6	Brown Creeper			X			X	X			X	X			X	X				
2	6	Ruby Crowned Kinglet			X											X	X			X	X
2	6	Yellow-bellied Sapsucker						X	X			X	X			X	X				
2	6	Red squirrel			X			X	X			X	X			X	X			X	X
2	7	Boreal Owl		X	X										X	X	X		X	X	X
2	8	Great Gray Owl	X	X	X									X	X	X	X	X	X	X	X
2	11	Three-toed Woodpecker			X															X	X
3	15	Wolverine	X	X[1]	X									X	X[1]	X	X	X	X[1]	X	X
3	16	Canada Lynx	X	X	X									X	X	X		X	X[1]	X	
5	19	Gray Wolf	X	X	X	X	X[2]	X	X	X	X[2]	X	X	X	X	X	X	X	X[1]	X	X
5	19	Grizzly Bear	X	X[1]	X	X	X[2]	X	X	X	X[1]	X	X		X[1]	X	X	X	X[1]	X	X
5	20	Mountain Goat					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	22	Bighorn Sheep				X				X				X				X			
5	22	Elk		X	X		X	X	X		X	X	X		X	X	X		X	X	X
5	22	Mule Deer																			
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				

TABLE 3-13
Special Habitat Features and Source Habitats for S-CNF Weed EIS Species of Focus[a]; adapted from U.S. Forest Service 2002a and Wisdom et al. (2000)

			Cold Forest			Dry Forest																
			Spruce/Fir/Lodgepole			Ponderosa Pine				Douglas-Fir with Ponderosa Pine				Douglas-Fir without Ponderosa Pine				Douglas-Fir/Lodgepole Pine			
Fmly	Grp	Common Name	ES	MS	LSM	ES	MS	LSM	LSS	ES	MS	LSM	LSS	ES	MS	LSM	LSS	ES	MS	LSM	LSS
6	25	Northern Goshawk (winter)					X	X	X												
7	26	Bald Eagle						X				X^3									
7	26	Harlequin Duck						X^3				X^3									
7	26	Yellow Warbler																			
7	26	Spotted Frog																			
7	27	Townsend's Big-Eared Bat					X^1	X	X		X^2	X	X	X	X	X	X		X^1	X	X
7	28	Spotted Bat					X^2	X	X		X^2	X	X	X	X	X	X				
7	28	Peregrine Falcon																			
8	29	Mountain Bluebird				X			X	X				X							
10	31	Vesper Sparrow																			
10	31	Pronghorn																			
11	33	Pygmy rabbit																			
11	33	Sage Grouse																			

TABLE 3-13
Special Habitat Features and Source Habitats for S-CNF Weed EIS Species of Focus[a]; adapted from U.S. Forest Service 2002a and Wisdom et al. 2000

			Riparian Woodlands						Upland Shrubland										Herb	
			Aspen			Cottonwood Willow			Chokecherry Serviceberry Rose			Mountain Mahogany		Big Sagebrush			Mtn big sagebrush		Grass	
Fm	Grp	Common Name	ES	MS	LSM	ES	MS	LSM	Ts	Cms	Ch	Os	Cs	Os	Cs	Ch	Os	Cs	Ch	Oh
1	1	Pygmy Nuthatch																		
2	5	Northern Goshawk (summer)							X	X	X									
2	5	Flammulated Owl		X	X		X													
2	5	American Marten		X	X															
2	5	Fisher					X	X												
2	6	Pileated Woodpecker																		
2	6	Brown Creeper																		
2	6	Ruby Crowned Kinglet																		
2	6	Yellow–bellied Sapsucker		X	X		X	X	X	X	X									
2	6	Red squirrel																		
2	7	Boreal Owl		X	X															
2	8	Great Gray Owl	X	X	X															
2	11	Three-toed Woodpecker																		
3	15	Wolverine																		
3	16	Canada Lynx	X	X	X	X	X	X												
5	19	Gray Wolf	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X
5	19	Grizzly Bear	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X
5	20	Mountain Goat																		
5	22	Bighorn Sheep			X															
5	22	Elk	X	X	X				X	X	X	X	X	X	X					X
5	22	Mule Deer																		

TABLE 3-13
Special Habitat Features and Source Habitats for S-CNF Weed EIS Species of Focus[a]; adapted from U.S. Forest Service 2002a and Wisdom et al. 2000

			Riparian Woodlands						Upland Shrubland										Herb	
			Aspen			Cottonwood Willow			Chokecherry Serviceberry Rose			Mountain Mahogany		Big Sagebrush			Mtn big sagebrush		Grass	
Fm	Grp	Common Name	ES	MS	LSM	ES	MS	LSM	Ts	Cms	Ch	Os	Cs	Os	Cs	Ch	Os	Cs	Ch	Oh
6	25	Northern Goshawk (winter)							X	X	X									
7	26	Bald Eagle			X			X												
7	26	Harlequin Duck			X			X												
7	26	Yellow Warbler	X	X	X	X	X	X												
7	26	Spotted Frog	X	X	X	X	X	X												
7	27	Townsend's Big-eared Bat		X	X		X	X				X	X	X	X		X	X		
7	28	Spotted Bat												X	X		X	X		
7	28	Peregrine Falcon	X	X		X	X													
8	29	Mountain Bluebird	X		X				X			X		X		X	X		X	
10	31	Vesper Sparrow												X	X	X	X	X		
10	31	Pronghorn												X	X	X	X	X		
11	33	Pygmy rabbit												X	X	X	X	X		
11	33	Sage Grouse												X	X	X	X	X	X	

TABLE 3-13
Special Habitat Features and Source Habitats for S-CNF Weed EIS Species of Focus[a]; adapted from U.S. Forest Service 2002a and Wisdom et al. 2000

			Riparian Woodlands									Upland Shrubland							Herb	
			Aspen			Cottonwood Willow			Chokecherry Serviceberry Rose			Mountain Mahogany		Big Sagebrush			Mtn big sagebrush		Grass	
Fm	Grp	Common Name	ES	MS	LSM	ES	MS	LSM	Ts	Cms	Ch	Os	Cs	Os	Cs	Ch	Os	Cs	Ch	Oh

[1] – not stem exclusion closed
[2] – not stem exclusion open or closed
[3] – needs to be near water
ES – early-seral
MS – mid-seral
LSM – late-seral-multi-layer
LSS – late-seral single-layer
Ts – tall shrub
Cms – closed medium shrub
Ch – closed herbland
Os – open shrub
Cs – closed shrub
Oh – open herbland

TABLE 3-14
Source Habitat Groups and Families Assigned to the 31 Terrestrial Vertebrate Species Analyzed in this Document based on Wisdom et al. (2000)

Family	Type
Family 1	**Low Elevation, Old Forest Family**
Group 1	Pygmy nuthatch
Family 2	**Broad Elevation, Old Forest Family**
Group 5	Northern goshawk (summer habitat), flammulated owl, American marten, fisher
Group 6	Pileated woodpecker, brown creeper, ruby crowned kinglet, yellow-bellied sapsucker (formerly grouped with the red-naped sapsucker), red squirrel
Group 7	Boreal owl
Group 8	Great gray owl
Group 11	Three-toed woodpecker
Family 3	**Forest Mosaic Family**
Group 15	Wolverine
Group 16	Canada lynx
Family 5	**Forest and Range Mosaic Family**
Group 19	Gray wolf and grizzly bear
Group 20	Mountain goat
Group 22	Elk and mule deer (migration routes and winter range) and bighorn sheep
Family 6	**Forest, Woodland, Montane Shrub Family**
Group 25	Northern goshawk (winter)
Family 7	**Forest, Woodland, and Sagebrush Family**
Group 26	Bald eagle, harlequin duck, yellow warbler, spotted frog
Group 27	Townsend's big-eared bat
Group 28	Spotted bat, peregrine falcon
Family 8	**Rangeland and Early- and Late-Seral Forest Family**
Group 29	Mountain bluebird
Family 10	**Range Mosaic**
Group 31	**Vesper sparrow and pronghorn**
Family 11	**Sagebrush**
Group 33	Sage grouse (summer and winter) **and pygmy rabbit**

TABLE 3-15
Source Habitat Trends for the Nine Families in the Central Idaho Basin ERU (Wisdom et al. 2000) used for Analysis in this Document

Family	Percentage of Watersheds Decreasing	Percentage of Watersheds Neutral	Percentage of Watersheds Increasing	Dominant Trend
1	57	33	9	Decreasing
2	43	22	35	Neutral
3	21	48	31	Neutral
5	18	52	30	Neutral
6	48	22	30	Neutral
7	34	36	30	Neutral
8	79	15	6	Decreasing
10	35	37	28	Neutral
11	42	30	27	Neutral

S-CNF

Declines in ponderosa pine and dry Douglas-fir old-forest single-story have occurred Forest-wide (U.S. Forest Service 1995b; U.S. Forest Service 2002a). The primary reasons for decline are similar to family 1. Timber harvest and fire exclusion are the two primary reasons for the decline in old-forest single-story, and the resulting increase in multi-storied stands. The decline in ponderosa pine within the dry Douglas-fir PVTs is directly related to fire suppression. Dry Douglas-fir PVTs have gradually shifted from ponderosa pine-dominated communities to more shade-tolerant Douglas-fir, which is represented by an increase in late-seral multi-layer forests.

c) Family 3: Forest Mosaic Family—Group 15 – Wolverine; Group 16 – Lynx

Source Habitat and Special Habitat Features

Species in this family are habitat generalists and use a variety of different habitats in the lower-montane, montane, subalpine, and riparian woodlands. Special habitat features include downed logs that are used for nesting and denning sites and talus slopes as potential denning sites for the wolverine (Wisdom et al. 2000). Additionally, large remote tracts of land with limited human disturbance are important, especially for the wolverine (Ruggiero et al. 1999).

Broadscale-Columbia River Basin and the Central Idaho ERU

Trends in source habitat for family 3 were predominately neutral for watersheds within the basin including the Central Idaho ERU (Wisdom et al. 2000). Overall changes in the extent of source habitats since historic period were not substantial, however Hann et al. (1997) detected notable changes in the extent of terrestrial community types that compose source habitat. In particular, the lower montane, montane, and subalpine communities showed contrasting changes in structural stages. The lower montane and montane communities were projected as having a decline in early- and late-seral stages and an ecologically significant increase in mid-seral stages. The subalpine community showed a decline in late-seral multi-layer and ecologically significant increases in early- and late-seral single layer.

S-CNF

Trends vary for the lower montane and montane habitats for the S-CNF compared to trends reported by Hann et al. (1997) for the Central Idaho ERU. Similarities include a decline in early- and late-seral. Specific to the S-CNF is a substantial decline in late-seral single and increases in mid-seral. Notable differences between the S-CNF in comparison to the ERU include a greater departure in late-seral multi-layer, which is nearly double the amount of the current ERU and early seral, which is less than half of the current ERU. This suggests the S-CNF is in much greater departure from historic conditions than the overall values assigned to the ERU for early-seral and late-seral multi-layer for the dry forest PVGs.

Wolverine. Wolverines are considered rare mammals and little is known about this carnivore. Historical accounts are few, but a biological reconnaissance of south-central Idaho (Merriam 1891) describes wolverines, along with martens and fishers, as "common" to the spruce and Douglas-fir zones of the Salmon River Mountains. Wolverines are considered secretive and solitary, and they are notorious for occupying inaccessible high elevation mountainous habitat (Banci 1994). Wolverines also use boreal and mountain forests (Groves et al. 1997) in all structural stages except closed canopy stem exclusion (Wisdom et al. 2000). High elevation basins that function as natal den sites are found in the upper reaches of watersheds on the S-CNF.

Canada Lynx. Habitat for the Canada lynx exists within the S-CNF and lynx occurrences are documented for the Salmon River watershed (Lewis and Wenger 1998). The S-CNF identified and mapped (U.S. Forest Service 2000a) LAUs (lynx analysis units) based on general guidance provided in the Lynx Conservation Assessment and Strategy (Ruediger et al. 2000). LAU boundaries for the S-CNF are based on 6th code hydrologic units and are generally larger than 10,000 acres.

Suitable lynx habitat is defined as having the capability to provide necessary habitat components for denning and foraging. Existing condition of suitable habitat may or may not meet the needs of a lynx. Changes in condition of suitable habitat can occur from natural disturbances such as fire, wind events, and erosion; timber harvesting; or the lack of disturbances. Aspen, snowberry, serviceberry, and chokecherry, and dense stands of young conifer provide important habitat for snowshoe hare, the primary prey species for lynx. Mature closed canopy forests provide habitat for the red squirrel, an important alternate prey species for lynx. Riparian habitats, willow, cottonwood, and other streamside vegetation provide important travel corridors for lynx.

Non-lynx habitat includes ponderosa pine and dry Douglas-fir with a ponderosa pine component. Lynx may use the dry forest type incidentally but it is not considered a major component of lynx habitat.

Denning habitat is limited to the mature structural stages in the moist Douglas-fir, subalpine fir, and lodgepole pine habitats that have sufficient amounts of large woody debris on the ground.

Foraging habitat is variable and dependent on available prey species such as snowshoe hare and red squirrels. Denning and foraging habitat are not mutually exclusive and commonly occur on the same areas of suitable habitat. Large patches of densely spaced seedling and sapling-sized conifer trees with low branches characterize snowshoe hare habitat.

Linkage corridors are defined as landscape areas that "connect forested habitats that allow lynx and other wide ranging carnivores to easily move long distances in search of food, cover and mates" (Ruediger et al. 2000). Landscape corridors characterized by extensive, continuous habitat connectivity go beyond the function of allowing daily and seasonal movements between home range segments. Such corridors in a fragmented habitat matrix may provide key connectivity between subpopulations in large habitat patches, functioning as landscape linkages and dispersal corridors (Harris 1984).

The S-CNF is situated along the west side of the northern continental divide, a widely recognized landscape linkage corridor connecting the Northern and Southern Rockies (Montgomery 2001; Noss et al. 2001). This landscape linkage corridor extends south of the S-CNF boundary to the Greater Yellowstone Ecosystem and north into Canada. The Forest Service lynx map has designated that portion of the Rocky Mountains on the S-CNF as the Northern Continental Divide Corridor. This corridor provides north-south connectivity for dispersing lynx and other wide-ranging carnivores.

d) Family 5: Forest and Range Mosaic Family—Group 19 – Gray wolf and grizzly bear; Group 20 – Mountain goat; Group 22 – Elk and mule deer–big game winter range and migration routes and bighorn sheep

Source Habitat and Special Habitat Features

Species in this family use all of the structural stages in the montane, lower montane, and subalpine community types; the grizzly bear also uses alpine and rocky areas (Wisdom et al. 2000). Riparian, woodlands, shrublands, herblands, and single- and multi-layer mid- and late-seral forests are considered important winter habitats for elk and mule deer.

Broadscale-Columbia River Basin and the Central Idaho ERU

More than 50 percent of the watersheds showed a stable trend in source habitat for family 5 (Wisdom et al. 2000). The Central Idaho ERU was reported as having a neutral trend but there were also a number of watersheds within the ERU that had an increasing trend. Basin-wide increases in source habitat are related to declines in old forest and subsequent increase of mid-seral structural stages that also serve as source habitat for members of this family.

S-CNF

S-CNF trends follow that of the basin and sub-basin in declines of late-seral single-layer but not in late-seral multi-layer. Fire exclusion has resulted in a continuing decline of the remaining old forest single layer and a subsequent increase of old forest multi-layer in the montane and lower montane types. Areas that were harvested in recent times have caused an overall decline of late-seral stages and an increase in mid-seral stages.

Gray wolf. Gray wolves were discussed at length earlier in this section.

Grizzly bear. This species (*Ursus arctos horribilis)* was federally listed as threatened on March 11, 1967. On November 11, 2000, the USFWS listed some populations in Montana and Idaho as experimental in order to facilitate restoration to designated recovery areas. These recovery areas are based on three remaining large 'islands' of bear habitat in the U.S. and adjacent Canada. These have been designated as the Northern Continental Divide Ecosystem, Bitterroot (or Salmon-Selway) Ecosystem, and Yellowstone Grizzly Bear Ecosystem (or Greater Yellowstone Ecosystem) Recovery Zones by the USFWS

(58 FR 68543). The Bitterroot (Salmon-Selway) Ecosystem has historically supported grizzly bear populations, but these bears were removed by direct killing and loss of habitat and prey (particularly salmon). A reintroduction effort is currently being considered in this Recovery Zone. The species' status for this area is experimental. Grizzly bears in the Yellowstone and Northern Continental Divide grizzly bear recovery zones remain listed as threatened under the ESA.

The grizzly (or brown) bear was once found in a wide variety of habitats, including open prairie, brushlands, riparian woodlands, and semidesert scrub. Grizzly bears have one of the largest home range areas of all land animals, between 300 and 1,000 square miles. This immense range encompasses a series of habitats, most of which are in upper elevation forested wild lands such as portions of the S-CNF. This species is common only in habitats where food is abundant and concentrated, including white-bark pine, berries, salmon or cutthroat trout runs, and caribou calving grounds. As the end of summer approaches, bears enter a biological phase called hyperphagia, the period of time when they eat tremendous amounts of food to store extra pounds of fat before entering the den. Huckleberries are one of their favorite foods at this time of year.

Mountain goat. Mountain goats are found in alpine and subalpine habitat (from sea level to about 2,440 m) 8,000 feet), but usually at timberline or above) on steep grassy talus slopes, grassy ledges of cliffs, or alpine meadows (Groves et al. 1997). They may seek shelter and food in stands of spruce or hemlock in winter. They graze on grasses and forbs in summer and browse shrubs and conifers. The winter diet is often variable when they may feed on mosses and lichens, as well as grasses, shrubs, and conifers.

Elk and mule deer. Several primary elk migration corridors exist within the S-CNF. The migration corridors support movement of large numbers of elk between Montana summer range and Idaho winter range along the Salmon River. The herds that repeat this movement each year are locally known as the interstate elk herd. Several thousand animals migrate from Montana into the North Fork Ranger District to winter ranges near Wagonhammer, south of Gibbonsville. Migration routes occur from Montana's Big Hole Valley (May Creek), Lost Trail Pass, and West Fork and pass through Idaho's Hughes Creek, Lick Creek, Sheep Creek, Dahlonega Creek, Anderson Creek, and the Granite Mountain area. The elk migration routes provide winter access into key winter range in Crone Gulch, Anderson Mountain, Threemile, Lick, Sheep, and Silverlead Creeks in the S-CNF and the Wagonhammer-Burns Basin adjacent to the southern portion of the S-CNF.

Key big game winter range is that portion of the winter range used by elk during severe winter conditions and is considered essential for the species survival (Elk Habitat Relationships for Central Idaho, U.S. Forest Service 1981).

The majority of elk winter range occurs at elevations generally below 5,500 feet, and is characterized by the ponderosa pine series. This vegetation type provides forage and thermal cover during the winter, and early spring forage. Large ponderosa pine trees provide important bedding sites. Shrub species present in the pine communities provide important forage and include sagebrush, bitterbrush, and mountain mahogany. Douglas-fir communities are more prevalent within the S-CNF and are found in the mid-elevations in a wide band. Elk and mule deer use the lower elevation Douglas-fir communities extensively for winter thermal cover. Perennial grasses and forbs in the Douglas-fir communities

provide important winter forage and, where present, sagebrush, bitterbrush, or mountain mahogany are used by mule deer. Douglas-fir communities occur in many of the drainages throughout the S-CNF (U.S. Forest Service 1998a). Vegetation types that do not provide winter range habitat occur at higher elevation where snow depth limits movement.

Security habitats are contiguous areas of vegetation that provide a combination of hiding cover and space that protect elk during periods of stress. Size of the area varies based on remoteness, topography, and vegetation that will provide a sense of security to the elk. High-quality security blocks are present in the unroaded portions along the northern, eastern, and northwestern S-CNF boundaries (Lost Trail-Gibbonsville Integrated Resource Analysis U.S. Forest Service 1995b).

Bighorn sheep. Bighorns are found in alpine-desert grasslands associated with mountains, cliffs, foothills, or river canyons (Groves et al. 1997). They often eat grasses, but the diet also includes significant amounts of shrubs and forbs. Shrubs may dominate summer diet in some areas.

e) Family 6: Forest, Woodland, Montane Shrub Family—Group 25 –Northern goshawk (winter)

Source Habitat and Special Habitat Features

Source habitats that occur in the S-CNF for this family include old and unmanaged young forests in lower montane (ponderosa pine, dry Douglas-fir PVTs), montane forests (interior Douglas-fir PVT), mature riparian and upland woodlands, chokecherry-serviceberry-rose, mountain mahogany, and riparian shrublands. Special winter habitat features for the goshawk include prey components including snags, downed logs, woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest structural stages (Reynolds et al. 1992; Wisdom et al. 2000).

Broadscale-Columbia River Basin and the Central Idaho ERU

The majority of watersheds (45 percent) in the basin had decreasing trends, while 37 percent had increasing trends; the Central Idaho ERU is reported as having an overall neutral trend. Declines were associated with a reduction in late-seral and early-seral lower montane and montane forests, riparian woodlands, and riparian shrublands (Hann et al. 1997). Increases were associated with transitions to mid-seral forests, primarily managed young forests, and to increases in upland woodland community group.

S-CNF

The S-CNF follows the same trends described for the broadscale basin and Central Idaho ERU. Declines in the early-seral and late-seral single-layer lower montane and montane have resulted in an increase in mid-seral and late-seral multi-layer structures in the ponderosa pine and dry Douglas-fir PVTs.

Trends for riparian and upland woodland are not known for the fine-scale S-CNF, however, it is likely that these communities have declined due to the increase in mid-seral conditions.

Northern goshawk. The northern goshawk is considered a rare resident (Roberts 1992) and a Region 4 Forest Service sensitive species. Source habitats that occur in the S-CNF for this species include old and unmanaged young forests in lower montane (ponderosa pine, dry Douglas-fir PVTs), montane forests (interior Douglas-fir PVT), mature riparian and upland

woodlands, chokecherry-serviceberry-rose, mountain mahogany, and riparian shrublands. Summer habitat for the northern goshawk is described in Family 2, Group 5. Northern goshawk populations are known as partial migrants; some portion of the northern goshawk populations winter outside the breeding area, while others do not (Squires and Reynolds 1997).

f) Family 7: Forest, Woodland, and Sagebrush Family—Group 26 – Bald eagle, harlequin duck, yellow warbler, and spotted frog; Group 27 – Townsend's big-eared bat; Group 28 – Peregrine falcon and spotted bat

Source Habitat and Special Habitat Features

All species in this family use a variety of vegetation types and structural stages as their source habitat (Wisdom et al. 2000). Several of the species in this group have canyons, cliffs, or caves as a special requirement for roosting or nesting except the yellow warbler and spotted frog; and most require proximity to water to meet habitat needs. The Townsend's big-eared bat requires caves or mine shafts for roosting or hibernacula; the spotted bat uses cracks and crevices in cliffs and canyons; the peregrine falcon nests on cliff ledges generally near large bodies of water; the harlequin duck hens nest in cliff cavities or tree cavities near forested streams; the bald eagle builds nests in tall trees or cliffs near water; the yellow warbler is a riparian generalist that requires dense tall riparian shrubs for nesting and foraging;. Both bat species use riparian areas for foraging because of high insect density, the bald eagle uses water for hunting fish and waterfowl. Peregrines often include fish in their diet (although in Idaho they primarily eat small birds). The harlequin duck feeds on crustaceans and small fish and the yellow warbler eats caterpillars and spiders that are abundant in riparian thickets.

Yellow Warbler. Yellow warblers are primarily restricted to tall shrubby riparian communities that occur along rivers and streams, the edges of marshes and swamps, and leafy bogs because these habitats support a large variety of insects and provide suitable nesting habitat. Characteristics of good yellow warbler habitat include concealing cover for nesting, tall singing perches, and feeding areas in dense tall shrubs including willow, alder, and elderberry (Animaldiversityweb 2003; Cornell Lab of Ornithology web site 2003).

Columbia Spotted Frogs. The Columbia spotted frog is a highly aquatic species and nearly always is found in proximity to water, including lakes, ponds, slow streams, and marshes (Groves et al. 1997). Breeding habitats include a variety of relatively exposed, shallow-water (<60 cm), emergent wetlands such as sedge fens, riverine over-bank pools, beaver ponds, and the wetland fringes of ponds and small lakes (Nussbaum et al. 1983). Vegetation in the breeding pools generally is dominated by herbaceous species such as grasses, sedges (*Carex* spp.), and rushes (*Juncus* spp.). After breeding is completed, adults often disperse into adjacent wetland, riverine, and lacustrine habitats (Amphibiaweb, 2003). In the northern part of their range they are inactive during the winter, and most Columbia spotted frogs hibernate and aestivate.

Broadscale-Columbia River Basin and the Central Idaho ERU

Broadscale trends for species in the group are limited to Townsend's big-eared bat and the spotted bat. No broadscale trends are available for the other species due to fine-scale mapping characteristics of their source habitats (Wisdom et al. 2000). For the two bat species, basin-wide trends were mixed with the majority (47 percent) of watersheds

showing a neutral trend; 32 percent had declining trends. The Central Idaho ERU had an overall neutral trend with 34 percent of the watersheds reported as declining and 30 percent increasing. Basin-wide decreases in old-forest structural stages have been offset by increases in mid-seral stages (Hann et al. 1997). Riparian vegetation has declined in extent basin-wide (Lee et al. 1997).

S-CNF

Trends for the S-CNF are similar to the broad-scale trends for the basin and ERU, particularly the decline in riparian habitat across all land ownerships and large tree structures associated with riparian conditions. Special nesting and roosting requirements that depend on cliffs and crevices have probably not changed much from historic conditions; however, mine shafts increased in the late 1800s and early 1900s; suitable mine sites for roosting and wintering sites may have declined after the 1980s due to mine closures for safety reasons.

g) Family 8: Rangeland and Early- and Late-Seral Forest Family—Group 29 – Mountain bluebird;

Source Habitat and Special Habitat Features

Mountain bluebird. Mountain bluebird source habitat contains open woodland and conifer or edge habitats (Erlich et al. 1988). Family 8 in Wisdom et al. (2000) has only one species, the western bluebird whose habitat is represented by unique combinations of woodland, shrublands, grasslands, and early- and late-seral forests. The mountain bluebird has similar source habitat requirements including the use of burned forests and snags with cavities for nesting (Fire Effects Information System 2002; Hutto 1995).

Broadscale-Columbia River Basin and the Central Idaho ERU

Source habitats for family 8 have declined in 72 percent of watersheds (Wisdom et al. 2000). This decline has occurred in more than 50 percent of watersheds within most of the ERUs that provide source habitat for this species. The Central Idaho ERU had 79 percent of watersheds in decline, 15 percent neutral, and 6 percent increasing.

S-CNF

The S-CNF trends are similar to the basin and ERU declining trends. Ponderosa pine and dry Douglas-fir PVT early-seral and late-seral single-layer structural stages have declined and the multi-layer mid- and late-seral structural stages have increased. This loss of open and early-seral structural stages has caused a decline in source habitat for the mountain bluebird. The increase in multi-layer structural stages has resulted in the reduction of shrublands and edge communities because the forest structures are more homogeneous. Fewer acres of burned forest structure exist today than historic estimates, resulting in a decline in special features associated with mountain bluebird source habitat.

h) Family 10: Range Mosaic—Group 31 – Ferruginous hawk, burrowing owl, short-eared owl, vesper sparrow, lark sparrow, western meadowlark, and pronghorn

Source Habitat and Special Habitat Features

Source habitats for this group include various shrub, grass, and herbaceous cover types. All species in this group have source habitats in big sagebrush and fescue-bunchgrass cover types, six share low sagebrush, and five have source habitats in juniper/sagebrush, mountain big sagebrush, native forb, and wheatgrass bunchgrass types. Whereas particular

plant species may differ geographically, a key feature of this group is their preference for open cover types with a high percentage of grass and forbs in the understory. All species use the shrub component of the vegetation directly for nest sites, perch sites, or hiding cover (Wisdom et al. 2000).

Vesper Sparrow. Vesper sparrows are among the most widely distributed of the species in Group 31. Loss of large acreage of shrub-steppe and fescue-bunchgrass because of an increased fire frequency, cheatgrass invasion, brush control, and conversion to agriculture adversely affect vesper sparrows and other species in this group (Wisdom et al. 2000).

Pronghorn. The pronghorn is the least widely distributed species in the group. Pronghorn move into areas of higher shrub cover in the winter. They may depend on free water in the summers of dry years when they cannot meet water requirements from succulent forbs (Beale and Smith 1970; Clemente et al. 1995). However, in most years the availability of free water does not affect pronghorn habitat use (Deblinger and Alldredge 1991). Pronghorn numbers declined to near extinction because of indiscriminant hunting between 1850 and 1900, but have recovered dramatically since then (Wisdom et al. 2000).

Broadscale-Columbia River Basin and the Central Idaho ERU

Source habitats for family 10 have declined in 59 percent of Columbia Basin watersheds (Wisdom et al. 2000). This decline has occurred in more than 50 percent of watersheds within 10 of the ERUs that provide source habitat for this family. The Central Idaho ERU had 35 percent of watersheds in decline, 37 percent neutral, and 28 percent increasing. Wisdom et al. (2000) noted that the Central Idaho Mountains was the only ERU in the Columbia Basin where the number of watersheds with moderately or strongly declining trends in source habitats did not outnumber those with increasing trends. Increases were attributed to large relative increases in juniper/sagebrush, juniper woodlands, and low sagebrush, all of which covered only a small fraction of the unit.

S-CNF

The S-CNF trends are similar to the 65 percent of the watersheds within the Central Idaho Mountains ERU as being generally stable to slightly increasing. Loss of source habitat through agricultural conversion or cheatgrass invasion is rare on the Forest. The lack of fire has increased sagebrush density in some locations but is not widespread. Livestock grazing has also influenced the distribution of the shrub overstory with the herbaceous understory but this too is generally localized and not widespread.

i) Family 11: Sagebrush—Group 33 – Northern sage grouse (summer and winter), sage thrasher, Brewer's sparrow, sage sparrow, lark bunting, pygmy rabbit, and sagebrush vole.

Source Habitat and Special Habitat Features

The species in this group have source habitats in two structural stages of big sagebrush and mountain big sagebrush: open canopy, low-medium shrub and closed canopy, and low-medium shrub. Four of the species (pygmy rabbit, sagebrush vole, sage grouse, and sage sparrow) also have source habitats in both structural stages of low sagebrush. Habitats used by only a single species in the group include herbaceous wetlands used by sage grouse.

Sage Grouse. Sage grouse were discussed in Section 3.C.3.c.

Pygmy Rabbit. The pygmy rabbit is uniquely dependent on sagebrush, which comprises up to 99 percent of its winter diet. It is one of only two North American rabbits that digs its own burrows. It is a strict sagebrush obligate, inhabiting sagebrush-dominated habitats in the Intermountain Region and Great Basin. Pygmy rabbits are one of a very few species, including pronghorn antelope and sage grouse, that can ingest large amounts of sagebrush leaves laden with terpenoids without major digestive disturbances and death (White et al. 1982, Katzner 1994).

The pygmy rabbit is an extreme habitat specialist at all levels, from the landscape level to placement of burrows and use of surrounding areas (Gabler 1997, Heady 1998, Heady et al. 2001). It is closely associated with clumps of tall dense sagebrush coupled with deep loose textured soils for burrow construction. Herbaceous vegetation is also important to pygmy rabbits (Lyman 1991), which augment their sagebrush diet with forbs and grasses. An understory composed of native grasses is believed important for most species in this group (Bock and Bock 1987; Connelly et al. 1991; Cooper 1868; Dobler et al. 1996; Gregg 1991; Hall 1928; Mullican and Keller 1986). Pygmy rabbits choose tall dense sagebrush for their burrows. Wisdom et al. (2000) assumed that this vegetation cover, which provides protection from predators, is important and that areas of bare ground would be avoided.

Habitat fragmentation readily isolates populations, as disruptions in sagebrush cover and open areas provide barriers to dispersal. The pygmy rabbit has very limited dispersal abilities and is reluctant to cross open areas, amplifying the effects of fragmentation.

Broadscale-Columbia River Basin and the Central Idaho ERU

Source habitats for family 11 have declined in 49 percent of Columbia Basin watersheds (Wisdom et al. 2000). This decline has occurred in more than 50 percent of watersheds within six of the 13 ERUs that provide source habitat for this species. The single largest loss in cover types within the basin was the decline in big sagebrush (Hann et al. 1997). The Central Idaho ERU had 42 percent of watersheds in decline, 30 percent neutral, and 27 percent increasing. Wisdom et al. (2000) indicates that sage grouse have been eliminated from five of the Basin ERUs and that populations are disjunct in three more of the 13 ERUs.

S-CNF

The S-CNF trends are similar to the 57 percent of the watersheds within the Central Idaho Mountains ERU as being generally stable to slightly increasing. Agricultural conversion is rare and conversion to cheatgrass from disturbance is not widespread. The lack of fire and livestock grazing has altered the proportion of the shrub overstory to the herbaceous understory, although this too is generally localized and not widespread. There has been some reduction of late seral riparian communities from lack of fire, livestock grazing, and altered stream flows from diversions, most notably in the more gentle, lower elevations of the Forest.

3.C.4. Ecosystem Function

Key ecosystem functions are processes that limit or control biological diversity, resilience to disturbance, and biotic productivity (Quigley and Arbelbide 1997). These include energy flow, the hydrologic cycle, the carbon and nutrient cycles, ecosystem food webs, and evolution. The energy flow function operates mostly at the global scale and evolution is

more directly tied to long-term change. The hydrologic cycle, carbon and nutrient cycles, and ecosystem food webs are most closely tied to regional/local scales and are addressed in this document. Native plant communities on the S-CNF positively affect these cycles by contributing to available water storage and subsequent groundwater discharge during drier times of the year, the beneficial use of space and nutrients, and enhanced plant diversity, complexity, and ecosystem viability. Current weed infestations on the S-CNF affect each of these cycles to some degree in localized areas by decreasing available water storage and subsequent groundwater discharge, outcompeting native plant species for space and nutrients, and eliminating plant diversity, thus reducing the complexity and viability of the ecosystem food web.

Hydrologic Cycle. Native plant communities on the S-CNF positively affect the hydrologic cycle, which involves the movement of water and its associated nutrients and energy. Water evaporates from water bodies (hydrosphere), precipitates over terrestrial areas, enters fluvial systems via runoff and groundwater discharge, and returns to the ocean. Native plant communities on the S-CNF benefit this cycle through the presence of a diversity of species that provide ecosystem complexity and stability, multiple complex canopies and root structures, uninhibited infiltration of water into the soil, minimization of sediment delivery to drainages, and a high soil water-holding capacity. Healthy riparian systems in native plant communities typically exhibit a sponge effect, storing water early in the year then discharging it as late-season base flows to streams that provide year-round habitat for aquatic resources. In contrast, weed infestations on localized areas of the S-CNF can affect hydrologic function through changing vegetation patterns, which in turn change the way water moves through the S-CNF. As diverse, multi-layer native plant communities are changed to monotypic (one species) weed stands having only a single canopy layer and simplified root structures, the patterns of runoff change. Infiltration of water into the soil tends to decrease, increasing the risk of "flashy" runoff events and increased potential for sediment delivery to streams. Water storage in the soil is reduced and late-season stream flows can decrease as late-season groundwater discharge slows from historical conditions. As noted previously, riparian systems are particularly important since they store water from spring runoff and slowly release it the rest of the growing season. Transpiration, the return of water vapor to the atmosphere from plant metabolism, also decreases as the plant community changes to less diverse populations.

Carbon and Nutrient Cycles. Healthy native plant communities on the S-CNF provide continuous carbon and nutrient cycling through plant productivity, mortality, and decomposition. These cycles are closely tied to the hydrologic cycle, as primary productivity is dependent on water. Fire is important to this cycle, because fire rapidly releases nutrients and carbon into the ecosystem. The carbon and nutrient cycles determine the productivity of biotic systems. The ability of a natural community to recover from disturbance is dependent on the level of productivity inherent to a community. Weed infestations on localized areas of the S-CNF can influence carbon and nutrient cycles in a variety of ways through disruption of native plant communities. Less diverse plant communities will have lower rates of carbon production and decomposition, leading to reduced carbon and nutrient cycles.

Ecosystem Food Webs. As native plant communities (primary producers) increase in complexity on the S-CNF, the base of the food web also increases in complexity as well as

stability and sustainability. This increased complexity in the food web base ripples throughout the food chain by providing higher levels of inputs and increased structure to support higher levels of organisms. Weeds tend to lower the complexity of plant communities and thus the ability to support a diversity of higher level organisms. Health of plant communities also depends on a healthy soil environment. Reductions in water infiltration and reduced amounts of organic matter stored in the soil through reduced decomposition rates, as a result of weed infestations on localized areas of the S-CNF, reduce soil health and subsequently reduce the rate of primary productivity.

3.D. Physical Resources

3.D.1. Surface Water

a. Hydrology

Watersheds on the S-CNF annually contribute an average of more than 2 million acre-feet of water to the Pacific Northwest River Basin System. Nearly all of the S-CNF's watersheds are tributary to the Salmon River, which empties to the Snake River and then the Columbia River. Major drainages on the S-CNF include the Panther Creek watershed, the entire North Fork of the Salmon River, nearly all of the major tributaries to the Lemhi River, some of the headwater tributaries to the Pahsimeroi River, much of the Middle Fork of the Salmon River, the Yankee Fork of the Salmon River, and numerous drainages that empty directly into the Salmon River. The S-CNF also contains some headwaters of the Big Lost and Little Lost River Systems, which sink into the upper Snake River Plain Aquifer. Surface water flows in S-CNF drainages are dominated by snowmelt from May through June, with peak flows occurring in late June and base flows occurring from late summer into winter. Drainage patterns are typically dendritic or "leaf vein" as streams flow from their sources down to the valley bottoms. All the watersheds on the S-CNF include the headwaters (source stream reaches), which then become lower-gradient transport stream reaches. Relatively few miles of low-gradient streams (response stream reaches) occur on the S-CNF compared to the higher-gradient transport and source stream reaches.

b. Water Quality

Most surface waters on public land fully support designated beneficial uses as defined by the State of Idaho. The principal and typically the most limiting beneficial uses are cold water biota, salmonid spawning, domestic water supply, and primary and secondary contact recreation. Other beneficial uses include wildlife habitats and aesthetics. The water quality of the streams on the S-CNF is influenced by the geology of the area. For example, streams originating in the quartzite rocks of the Lemhi Range have lower dissolved solids than streams originating in the carbonate rocks of the Lost River Range. The upper reaches of the Salmon River flow through a highly mineralized zone, causing a naturally high level of metals in the watershed. Improper practices associated with past mining and logging activities in the upper reaches of the Salmon River watershed have contributed to increased levels of toxic metals and sediment, respectively, and have been shown to destroy spawning habitat and adversely affect naturally occurring riparian habitat.

In lower-elevation valleys on the S-CNF and downstream of the S-CNF, water quality varies with the time of year and extent of human use. Most pollutants are from nonpoint sources;

in other words, no one single location or activity can be identified as the source. Generally, sedimentation from nonpoint sources like irrigated crop production, rangeland, pastureland, streambank modification, and roads is the primary pollutant of concern. Nutrients from cropland and pastureland, as irrigation return flows, are also identified as concerns.

Diversions are common along the lower reaches of the Salmon River and its tributaries. These diversions commonly affect the annual flow of the rivers; as a result some streams do not flow year-round. Other streams are affected by the region's dry climate; many smaller watersheds are entirely dependent on winter snows and spring rains for streamflow, and dry up by late summer. Two watersheds within the Forest provide municipal water – Jesse Creek for Salmon and Garden Creek for Challis.

c. 303(d) Stream Segments

The State of Idaho has designated water quality limited stream segments within the S-CNF. This designation is required by the Clean Water Act pursuant to §303(d). States are required to submit this list to the EPA every 2 years. The list represents a comprehensive status of water quality in Idaho. Streams, rivers, lakes, and reservoirs are evaluated for this list. The DEQ compiles a list of streams that are designated "water quality limited."

Forty-four stream segments within S-CNF boundaries and one lake that borders the S-CNF have been designated under §303(d). Primary pollutant concerns are sedimentation, elevated temperature, and nutrients. Sources of these pollutants include roads, runoff from concentrated livestock use, and streambank erosion. Water quality in these streams could also potentially be affected by runoff from weed control efforts such as herbicides if not applied properly, prescribed burning activities, and grazing. Elevated metals levels and habitat or flow alteration are concerns in some drainages. Table 3-16 identifies the boundaries/locations of stream segments and lake that have been designated on the State of Idaho Year 1998 303(d) list. Appendix I presents information on the miles of 303(d) streams on the S-CNF by Ranger District and HUCs 4 and 5.

TABLE 3-16
Water Bodies on the S-CNF Designated as "Water Quality Limited"

Water Body/Sub-basin	Boundaries	Pollutants
Upper Salmon River Sub-basin		
Salmon River	Redfish Lake Creek to East Fork Salmon River	Sediment, temperature
Squaw Creek	Headwaters to mouth	Temperature
Thompson Creek	Scheelite Jim Mill Site to Salmon River	Metals, sediment
Yankee Fork	Jordan Creek to Salmon River	Habitat, sediment
Yankee Fork	Fourth of July Creek to Jordan Creek	Habitat, sediment

TABLE 3-16
Water Bodies on the S-CNF Designated as "Water Quality Limited"

Water Body/Sub-basin	Boundaries	Pollutants
Middle Salmon-Panther Sub-basin		
Big Deer Creek	Big Deer Creek South Fork to Panther Creek	Metals, pH, sediment
Blackbird Creek	Blackbird Creek Reservoir to Panther Creek	Metals, pH, sediment
Bucktail Creek	Headwaters to South Fork Big Deer Creek	Metals
Diamond Creek	Headwaters to Salmon River	Unknown
Dump Creek	Headwaters to Salmon River	Sediment
Panther Creek	Blackbird Creek to Salmon River	Metals
Salmon River	Pahsimeroi River to Salmon River–North Fork	Unknown
Williams Lake		Dissolved oxygen, nutrients
Upper Middle Fork Salmon Sub-basin		
Elkhorn Creek	Headwaters to Middle Fork Salmon River	Flow alteration, sediment, temperature
Middle Salmon-Chamberlain Sub-basin		
Salmon River	Corn Creek to Cherry Creek	Unknown
Lemhi River Sub-basin		
Bohannon Creek	Headwaters to Lemhi River	Temperature
Cruikshank Creek	Creek Headwaters to Canyon Creek	Unknown
Kenney Creek	Headwaters to Lemhi River	Temperature
Kirtley Creek	Headwaters to Lemhi River	Temperature
Little Eightmile Creek	Headwaters to Lemhi River	Temperature
Sandy Creek	Headwaters to Lemhi River	Temperature
Short Creek	Headwaters to Bear Valley Creek	Unknown
Wimpey Creek	Headwaters to Lemhi River	Temperature
Little Lost River Sub-Basin		
Barney Creek	Headwaters to mouth	Temperature
Basin Creek	Headwaters to mouth	Temperature
Big Creek	Headwaters to mouth	Temperature
Big Springs Creek	Headwaters to mouth	Temperature
Coal Creek	Headwaters to mouth	Temperature
Deer Creek	Headwaters to mouth	Temperature

TABLE 3-16
Water Bodies on the S-CNF Designated as "Water Quality Limited"

Water Body/Sub-basin	Boundaries	Pollutants
Dry Creek	Headwaters to mouth	Temperature
Iron Creek	Headwaters to mouth	Temperature
Mill Creek	Headwaters to mouth	Temperature
Sawmill Creek	Mill Creek to Little Lost River	Sediment, temperature
Smithie Creek	Headwaters to mouth	Temperature
Squaw Creek	Headwaters to mouth	Temperature
Summerhouse Canyon	Headwaters to mouth	Temperature
Summit Creek	Headwaters to mouth	Temperature
Timber Creek	Headwaters to mouth	Temperature
Wet Creek	Coal Creek to Little Lost River	Flow alteration, sediment, temperature
Williams Creek	Headwaters to mouth	Temperature
Big Lost River Sub-basin		
Leadbelt Creek	Headwaters to mouth	Temperature
Little Boone Creek	Headwaters to East Fork Big Lost River	Unknown
Twin Bridges Creek	Headwaters to Big Lost River	Nutrients, sediment
East Fork Big Lost River	Starhope Creek to Forks	Habitat alteration
East Fork Big Lost River	Headwaters to Starhope Creek	Sediment, temperature

3.D.2. Groundwater Resources

a. Drinking Water Quality

Groundwater status in the upper reaches of the S-CNF is unknown. Many of the smaller tributaries are generated from springs, but the interactions among surface water, rate of movement, and sub-surface flows are unknown. In the valley bottomlands, some groundwater is mineralized (as in the Pahsimeroi Basin), but is generally potable. The Lemhi River originates from springs in the Lemhi Range, but little is understood about the relationship between groundwater and surface water. There are only seven deep groundwater wells used for irrigation in the Lemhi Basin.

3.D.3. Soils, Geology, and Minerals

a. Soils

Soils are an important consideration in managing weeds because soil and herbicides interact and weed infestations can affect the quality of the soil. From a herbicide interaction standpoint, important soil characteristics include soil texture (e.g., relative amounts of sand, silt, and clay particles less than 2 mm in size), the amount of coarse fragments greater than 2 mm, amount of organic matter, and soil permeability (the ease with which water moves though the soil). These soil characteristics control processes that affect herbicide behavior in soils. According to Donigian and Rao (1987), soil processes that affect the distribution and fate of chemical herbicides can be grouped into five categories as follows:

- Transport—affects herbicide movement through volatilization, runoff, erosion, and leaching
- Sorption and Partitioning—affects herbicide leaching rate through adherence to soil or organic matter particles
- Transformation and Degradation—affects persistence of herbicides in soil by changing to another chemical form
- Volatilization—chemical vapor from herbicides is lost through the soil or plants
- Root Uptake—herbicides are bioaccumulated, metabolized, or degraded in plants after root uptake

From a soil quality standpoint, weed dominance of a site can result in reduction of soil cover, biomass production, and accumulation of soil organic matter (U.S. Forest Service 2001a). As weeds take over a site, erosion rates increase, soil biochemical processes change, soil organism habitat is altered, and soil quality and soil productivity decline (Willard et al. 1988). These effects are a result of weeds replacing multi-canopy, diverse native vegetation stands with a one-species stand of weeds.

Soils on the S-CNF are derived from quartzites, granitic rock, volcanic rock, and sedimentary rock. Soils derived from different rock types have different properties, in general, relative to the soils' interaction with herbicides and in response to weed management activities. Clay content is important to leaching of herbicides through the soil profile. The higher the clay content, the less likely herbicides will leach into groundwater. However, if the clay layer is too close to the surface, precipitation cannot infiltrate into the soil and runoff of herbicide-laden water is possible. The amount of coarse fragments greater than 2 mm in the soil, such as gravels, cobbles, and stones, is also important. On average, all soil types on the S-CNF have moderate amounts of coarse fragments. Coarse fragment percentages greater than 35 percent are common. Volcanic and quartzite soils tend to have higher percentages with as much as 60 to 80 percent of the soil volume being fine gravel, cobble, and stone in some locations. Sedimentary and granitic soils tend to have lower coarse fragment content, with percentages below 10 percent not unusual. The higher the percentage of coarse fragments, the higher the infiltration rate is likely to be. However, coarse soil fragments (greater than 2 mm in size) and soil texture (particles less than 2 mm in size) can interact and/or counteract infiltration to an extent. For example, high infiltration rates due to a high percentage of coarse soil fragments can be reduced if the soil matrix has a

fine texture, and vice versa. Generally on the S-CNF, the percentage of coarse soil fragments (greater than 2 mm) is highest in quartzite soils, intermediate in granitic and volcanic soils, and lowest in sedimentary soils. Soil textures (less than 2 mm) would be most coarse in granitic soils, less coarse in quartzite soils, even less coarse in sedimentary soils, and finest in volcanic soils.

A high infiltration rate can potentially carry herbicides through the soil and into groundwater. However, soils with higher percentages of coarse fragments may be less susceptible to erosion than those where fine-textured soil particles dominate (e.g., silts and clays). In general, soils derived from granite and quartz have a lower clay content. Volcanic and sedimentary soils are more likely to have higher clay content. The majority of granitic soils have clay content in the 5 to 10 percent range. Volcanic soils may have clay content in the 10 to 15 percent range, but may have clay contents in excess of 20 percent. These soils are very resistant to erosion. Other volcanic and sediment-derived soils have clay contents in excess of 35 percent with few coarse fragments. These soils have slow infiltration rates and would not allow for much vertical movement of herbicides. Appendix I presents information on soils types on the S-CNF by Ranger District and HUCs 4 and 5.

Map 3-10 (back of chapter) depicts the geologic-derived soil types on the S-CNF. Very generally, the most frequently occurring predominant soil types by Ranger District tend to consist of the following: Challis Ranger District (volcanic, sedimentary, and quartzite); Leadore Ranger District (quartzite); Lost River Ranger District (sedimentary); Middle Fork Ranger District (volcanic and quartzite); North Fork Ranger District (quartzite and granitic); Salmon-Cobalt Ranger District (volcanic, quartzite, and granitic); and Yankee Fork Ranger District (volcanic, quartzite, and sedimentary).

b. Geology

The major landforms in the S-CNF are dissected mountains, breaklands, canyons, basins, foothills, and valleys. Bedrock and surface materials are granite formations with gneiss, schist, carbonate rocks (like the limestone cliffs along the Salmon River), and volcanic rocks. These mountains are major sources of minerals and sediments in the S-CNF.

Quigley and Arbelbide (1997) note three geological influences in the area: the Idaho Batholith, Tertiary (Challis) volcanics, and the sedimentary mountains of the Beaverhead Range. The Idaho Batholith is a large granite formation that runs through central Idaho and covers much of the S-CNF. It is characterized by high mountains of igneous granite, metamorphic rock, and some sedimentary rock. The Bitterroot Mountains, Sawtooth Mountains, Salmon River Mountains, and the Lemhi Range are characteristic of this feature. These mountains have been modified by wind erosion, glacial activity, and water to form high, craggy peaks. Structurally, the range fronts of these mountains are bounded by faults. Transverse faulting occurs throughout the S-CNF. The S-CNF is also characterized by the "basin and range" fault block valleys. Broad valleys are bordered by steep, narrow mountain ranges that extend like fingers into the basaltic plains of southern Idaho. The southern geology of the S-CNF is influenced by the Batholith and volcanic activity. The northern and eastern borders of the S-CNF are dominated by the Batholith, the Bitterroot Range, and the lakebed sediments of the Beaverhead Range and foothills.

c. Minerals

Significant production of gold, silver, uranium, tungsten, flourspar, molybdenum, lead, zinc, cobalt and copper has occurred within the S-CNF. Bentonite also occurs within the S-CNF. The Challis Ranger District has sites suitable for sand and gravel removal, and some oil and gas leasing has occurred in the past. However, current mineral development is limited by environmental concerns and low market prices.

3.D.4. Land Uses and Designations

This section presents information on commercial and recreational land uses as well as special land use designations on the S-CNF, which are depicted on Map 3-11 (back of chapter). Information on noxious weed management, direction, and philosophies on the S-CNF together with land use plans and relevant laws, regulations, and policies were described in Chapter 1 of this Final EIS.

a. Commercial Uses

Historically, commercial uses on S-CNF lands have been limited to timber harvesting, mining, and agriculture/livestock grazing. A recent trend toward recreation/tourism supports a growing outfitting and guide economy, discussed below in *Section 3.D.4.b, Recreation Uses.*

Agriculture/Livestock Grazing. Grazing has been an important part of the area's commercial viability since the late 1800s. Grazing on public lands continued unregulated until 1905, when the Forest Service began its strategy of individual allotments and grazing systems. There are 113 livestock grazing allotments on the S-CNF, 92 percent of which are cattle and horse permits while 8 percent are sheep permits with a total licensed grazing use of approximately 156,600 Animal Unit Months (AUMs). These allotments cover approximately 80 percent of the S-CNF leaving the remaining 20 percent unallocated to livestock grazing. Agriculture, primarily in the form of livestock production, remains an economic force in the communities surrounding the S-CNF. This use is affected by terrain, access, vegetation, and water availability. Grazing on the S-CNF can have mixed effects: while some grazing has been shown to decrease noxious weed populations, the movement of livestock in and out of grazing use areas also contributes to the invasion of noxious weeds.

Mining. Mining has played a significant role in the historical and present economic viability of the area. Mining played a role in the agricultural development of the lower valleys, and contributed to the growth of towns along freight roads designed to supply mines. Mines and abandoned claims dot the upper elevations of the S-CNF, but large-scale production has been curtailed by depressed prices, limited deposits, and environmental concerns. Currently, the Thompson Creek Mine in Custer County extracts molybdenum. Hecla operated a gold mine in Lemhi County until mid-2001. Smaller mining operations continue. Reclamation activities at Blackbird Mine, the Hecla site, and other sites continue to provide some economic benefit to the area. Many of the abandoned mining sites are infested with weeds due to extensive surface disturbance.

Timber. Large- and small-scale timber removal activities have occurred throughout the S-CNF. Forest resources were harvested for posts, poles, house logs, saw timber, and mining

timbers. Currently, timber is harvested for personal use (e.g., firewood and pole cutting) and commercial use. Because of site disturbance and increased access, these logged areas are likely more susceptible to weed invasion.

b. Recreation Uses

Recreation occurs on nearly all areas within the S-CNF, both on the land and rivers. The patterns of land recreation use are relatively stable. Summer is the busiest season. Recreational uses support a strong tourist-based economic segment. Outfitters and guides use lands and rivers within the S-CNF for rafting, hunting, and fishing opportunities. Local businesses increasingly rely on these uses as well as private individuals using the S-CNF.

Recent travel surveys indicate that 90 percent of travelers return to areas in and around the S-CNF after their initial visit (Idaho Department of Commerce 2000). Hunting and fishing account for more than $340 million a year in the State of Idaho (Idaho Department of Fish and Game 1999). Much of this activity occurs in the central mountains of Idaho, including lands on the S-CNF. In addition, tourism accounts for more than $200 million each year in central Idaho (Blaine, Custer, Lemhi, Butte, and Camas Counties) alone (Runyan et al. 1999). Tourism supplies more than 600 jobs in Custer County, and more than 200 in Lemhi County, with a smaller number (lees than 50) in Butte County (Runyan 1999). Visitors spent more than 1.7 billion dollars in Idaho in 1997.

Most of the recreation use occurs within the river corridors and is primarily associated with whitewater floating, motor boating, and fishing. Most use of aircraft landing strips located near the Middle Fork and Salmon Rivers is associated with river activities and ingress/egress to private lands. The landing strips provide airplane access for commercial and noncommercial river recreation during low water periods (mid to late season on the Middle Fork) or takeouts (i.e., Mackay Bar on the Salmon River).

Outside of the river corridors, typical summer activities include hiking; camping; fishing in the mountain lakes and streams; horse packing and horseback riding; rock climbing; berry picking; sightseeing; exploring; and scouting for fall hunting trips. Many visitors fly into the backcountry landing strips to camp, hike, and explore. Crowding at some high mountain lakes and landing strips occurs periodically from the time the snow melts off the high country until Labor Day weekend in September. During the fall, floating sharply declines while fishing and hunting activities increase substantially. Trailheads are often filled to capacity or overflowing, and travel on roads leading to trailheads can be a challenge. In the spring, use increases with antler hunting, camping, photography, hiking in the lower elevation river canyons, bear hunting, and mushroom picking. Winter use is lower, with a small number visiting for backcountry skiing, snowshoeing, winter camping, enjoying hot springs, and cougar hunting. At this time of year, opportunities for solitude and outdoor recreational challenges are the greatest.

Recreationists, private land owners, and others use the trail system for access to the S-CNF and private inholdings for a variety of reasons. S-CNF personnel use the trails for fire control, trail maintenance, special use administration, facility access, resource monitoring, and general patrolling of the area. Commercial outfitters, hunters, fishermen, and other recreationists are some of the other main trail users. Most trail users travel by foot or pack

and saddle stock. Noxious and invasive weeds have established themselves along many of these trails, likely adversely affecting the recreation experience.

c. Wilderness, Research Natural Areas, and Roadless Areas

Wilderness Areas. The FCRONRW, depicted on Map 3-11, is not a part of this Final EIS. In 1999, the Forest Service (1999b) issued its noxious weed treatments Final EIS for the FCRONRW. Copies of that Final EIS are available at the S-CNF Office in Salmon, Idaho.

Research Natural Areas. Map 3-11 depicts RNAs within the S-CNF. An RNA is an area reserved for scientific research and education. The focus of RNA designation is on maintaining ecosystem processes with emphasis on rare or unique vegetation characteristics. It is not promoted for general recreation use. The RNA designation prevents actions against "insects, diseases, wild plants, or animals unless the Regional Forester and Station Director deem such action necessary to protect the features for which the [RNA] was established or to protect adjacent features. If exotic plants or animals have been, or are, introduced into the RNA, the Station Director and the Regional Forester shall exercise control measures that are in keeping with the established management principle and standards to eradicate them, when practical." (Challis Forest Plan, as amended 1992a). The area of the former Challis National Forest has eleven RNAs: Iron Bog and Meadow Canyon (1981); Soldier Lakes, Surprise Valley, Merriam Lake Basin; Smiley Mountain; and Mahogany Creek (1992); and Sheep Mountain, Cache Creek Lakes, and Mystery Lake (1996); and Middle Canyon. The area of the former Salmon National Forest designates nine RNAs: Allan Mountain, Kenny Creek, Davis Canyon, Dry Gulch-Forage Creek; Frog Meadows, Mill Lake,.Bear Valley; Colson Creek; and Dome Lake Creek (Salmon Land and Management Plan, as amended April 1996). Appendix I presents information on acres of RNAs on the S-CNF by Ranger District and HUCs 4 and 5. The extent of weeds on the numerous RNAs has not been summarized, however comparing the individual HUCs from Appendix I and Appendix B gives an idea of the likelihood of weeds being present in a particular RNA.

Roadless Areas. Several areas within the more remote reaches of the S-CNF have been inventoried as roadless areas (depicted on Map 3-11); others have been identified as potential roadless areas. Recently, the U.S. Department of Agriculture promulgated new regulations about development of these areas (66 FR 3244). The Forest Service is now required to limit development of roads within these areas, concluding that such protection is "necessary to protect the social and ecological values and characteristics of inventoried roadless areas from road construction and reconstruction and certain timber harvesting activities. Without immediate action, these development activities may adversely affect watershed values and ecosystem health in the short and long term, expand the road maintenance backlog which would increase the financial burden associated with road maintenance, and perpetuate public controversy and debate over the management of these areas."

The Forest Service also recognized the value of these roadless areas to the diversity of plant and animal communities. The Forest Service concluded that inventoried roadless areas "conserve native biodiversity by serving as a bulwark against the spread of nonnative invasive species." (66 FR 3244). Appendix I presents information on acres of all inventoried roadless areas on the S-CNF by Ranger District and HUCs 4 and 5.

Inventoried roadless areas within the S-CNF where road construction and reconstruction is not allowed include portions of the North Fork, Salmon-Cobalt, and Leadore Ranger Districts that total approximately 329,000 acres. Some of the worst weed infestations (spotted knapweed) occur in the northern part of the S-CNF in the North Fork Ranger District. However, these infestations are generally outside of or adjacent to designated roadless areas in this Ranger District. These roadless areas tend to have fewer occurrences of noxious weed invasions than areas where road construction and reconstruction is allowed.

Lewis and Clark Trail Management Area. The Salmon Land and Resource Plan was amended in July 2000 to include management strategies for the Lewis and Clark Trail. The plan sets aside known trails used by the Corps of Discovery in preparation for the bicentennial anniversary of the expedition (2003 to 2006). The spread and control of noxious weeds is an important management goal. Any noxious weed management alternative must include tasks that will, as required by the plan, preserve the natural character of the Trail.

d. Wild and Scenic Rivers

The Middle Fork of the Salmon River (in the FCRONRW) was one of the first rivers in the U.S. to be designated as a Wild and Scenic River. In 1980, the Main Salmon from the North Fork downstream to Long Tom Bar was designated Wild and Scenic. Eligibility for "outstandingly remarkable" (OR) consideration was reevaluated across the Forest from 1989 through 1992. Seven resources were evaluated for possible OR values, any one of which would designate it as eligible for further consideration for designation. These seven resources are: Scenic (Sc), Recreation (Rec), Fish (F), Wildlife (WL), Geologic (Geo), Cultural Resources (CR), and Ecological (Ecol). Table 3-17 identifies the segments/locations of rivers and creeks that have been designated or deemed eligible for further consideration for designation, including those on the FCRONRW. Map 3-11 depicts wild and scenic river segments according to the alphabetized codes listed in Table 3-17. Appendix I presents information on the extent of designated wild and scenic rivers on the S-CNF by Ranger District and HUCs 4 and 5. There are no indications suggesting that weeds or weed treatments on the S-CNF have affected the wild and scenic rivers designation or eligibility characteristics. However, weeds have expanded as a result of increased river-based recreational activities.

3.D.5. Visual Resources

Scenery, the general appearance of a place and the arrangement of its individual features, is an important resource in the S-CNF. According to Quigley and Arbelbide (1997), viewing scenery is one of the highest ranked recreational activities in the Northwest. This demand is not limited to viewing alone; significant numbers of people who hunt, fish, and participate in other "consumptive" recreation activities value scenery highly and choose their recreation sites for scenery and aesthetic qualities as well as abundance of fish and game. The S-CNF's dry climate and predominantly sunny days provide unparalleled views.

These views are sometimes impaired by smoke from fires or dust from road use or agricultural activities. Weeds are also known to have the potential to impair the visual resources of the area. Except for weeds with massive floral displays, most invasive weeds affect foreground viewing. Primary travel corridors like highways, forest roads, trails, and river banks are most vulnerable to the introduction of invasive weeds.

TABLE 3-17
Status of Eligible Streams Under the Wild and Scenic Rivers Act

	Stream	Designation[1]	Segment	Miles	Outstandingly Remarkable (OR) Value[2]
Designated					
	Salmon (Main) River	Recreation	North Fork to Wheat Creek	46.8	
		Wild	Wheat Creek to Long Tom Bar (within FCRONRW)		
	Middle Fork Salmon River	Wild	Marsh/Bear Valley Creeks to confluence with Main Salmon (within FCRONRW)		
Eligible for Designation					
a[3]	Salmon (Main) River		North Fork upstream to 4th of July Creek	4.0	Sc/Rec
b	Camas Creek		Headwaters to mouth	13.1	F/WL/Sc/Rec
c	Panther Creek		Headwaters to mouth	44.0	Sc/Rec/F/WL/ Geo
d	Bear Valley Creek		Headwaters to mouth	10.0	Rec/F/WL/Ecol
e	Hayden Creek		Headwaters to S-CNF boundary	11.9	Rec/F/WL
	Loon Creek		Within FCRONRW		
	Loon Creek		Within FCRONRW		
f	Yankee Fork (A)		Headwaters to Salmon River	2.5	Rec/Geo
g	Yankee Fork (B)		Headwaters to Salmon River	6.5	CR
h	Yankee Fork (C)		Headwaters to Salmon River	6.5	CR
	Marsh Creek (A)		Within FCRONRW		
I	Marsh Creek (B)		Headwaters to FCRONRW boundary	4.5	Sc/Geo
j	East Fork Pahsimeroi River		Headwaters to confluence with West Fork	4.5	Sc/Geo
	West Fork Camas Creek		Within FCRONRW		
	Soldier Creek		Within FCRONRW		
	Muskeg Creek		Within FCRONRW		
	Rapid River		Within FCRONRW		
	Warm Springs Creek		Within FCRONRW		
k	Fall Creek		Headwaters to Wildhorse Creek	8.1	Sc
l	Summit Creek		Headwaters to near Trail Creek Summit	3.7	Sc

TABLE 3-17
Status of Eligible Streams Under the Wild and Scenic Rivers Act

	Stream	Designation[1]	Segment	Miles	Outstandingly Remarkable (OR) Value[2]
m	Lower Cedar Creek		Headwaters to S-CNF boundary	4.5	Geo
n	West Fork Yankee Fork		Headwaters to Yankee Fork	11.5	Sc
o	Kane Creek		Kane Lake to Summit Creek	9.1	Sc
p	Star Hope Creek		Headwaters to W. Fork Big Lost River	5.1	Geo
q	Muldoon Creek		Headwaters to West Fork of East Fork Big Lost River	9.3	Geo
r	Wildhorse Creek		Arrowhead Lake to Wildhorse Campground	5.9	Sc
s	Pahsimeroi River		Confluence of East and West Forks to S-CNF Boundary	1.5	Sc/Geo
t	Mill Creek		Headwaters to S-CNF boundary	10.5	CR
u	East Fork Big Lost River		Headwaters to S-CNF boundary	25.5	Sc/CR/Geo
v	West Fork Big Lost River		Confluence with Star Hope and Muldoon Creeks to East Fork of Big Lost River	10.2	Geo
w	Lake Creek		Headwaters to West Fork of East Fork Big Lost River	8.1	Sc/Rec
x	Pass Creek		Below private land in Section 2 to S-CNF boundary	2.4	Sc/Geo

[1]Designation Definitions:

Recreation (Rec)—Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Scenic (Sc)—Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Wild—Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

[2]OR Value Acronyms: CR = Cultural resources; Ecol = Ecological; F = Fish; Geo = Geologic; Rec = Recreation; Sc = Scenic; WL = Wildlife.

[3]**See Map 3-11 for corresponding wild and scenic river segments.

3.D.6. Air Quality and Noise

a. Air Quality

Air quality within the S-CNF is generally excellent. Some seasonal air quality degradation occurs during the fire season. In populated areas like Salmon, Challis, or Stanley, some winter degradation occurs from wood burning heaters combined with temperature inversions. These weather conditions usually last no more than a few days; air degradation is temporary. Dust from vehicular traffic on unpaved roads or wind disturbance also contributes to air pollution. In all cases, the primary pollutant is particulate matter. Pollutants rarely persist and are usually dispersed by prevailing winds.

b. Noise

Generally, noise levels are within acceptable levels within the S-CNF. Exceptions to this rule may include hunting and grazing activities that involve mechanized transportation. Mining and timber harvesting activities also affect noise levels.

3.E. Human and Socioeconomic Resources

3.E.1. Human Health and Safety

a. Public Health and Safety

The presence of noxious and invasive non-native weeds on the S-CNF are not known to have directly or indirectly affected human health and safety, and they do not pose significant health threats to a large segment of the population. Some weeds present on the S-CNF, such as tansy ragwort and St. Johnswort, can reportedly make people sick if ingested in large amounts, while other weed species may cause minor skin irritations or allergic reactions via their pollen. Dense infestations of Canada, musk, and other thistles can cause minor scrapes or irritate visitors' skin, but they are not known to cause lasting human health effects (U.S. Forest Service 2000b; 2001d). Hand-pulling weeds without the aid of gloves can cause minor skin irritations. Callihan et al. (1991, in U.S. Forest Service 2001d) stated that leafy spurge contains a latex-bearing sap that can irritate human skin and cause blindness in humans on contact with the eyes. The sap of Russian knapweed contains a known carcinogen, and Niehoff (1997, in U.S. Forest Service 2001d) reported that spotted knapweed sap also may be carcinogenic.

There have been no reported instances that past weed control efforts on the S-CNF, including the use of herbicides, have affected public health and safety. Areas treated with herbicides on the S-CNF in recent years have generally increased annually from approximately 580 acres in 1995 to approximately 3,370 acres in 2001. Precautions and notifications described in Chapter 2 are intended to avoid or mitigate any potential hazards to public health and safety from the treatment of noxious weeds. Potential effects of the proposed project on public health and safety are described in Chapter 4 of this Final EIS.

b. Worker Health and Safety

There have been no reported instances that noxious weeds or past weed control efforts on the S-CNF, including the use of herbicides as referenced above, have affected worker health

and safety. Worker health and safety could potentially be affected if weed control methods are not properly conducted. Precautions, notifications, and other safeguarding measures described in Chapter 2 that will be followed by workers are intended to avoid or mitigate any potential hazards to their health and safety. Potential effects of the proposed project on worker health and safety are described in Chapter 4.

3.E.2. Indian Trust Assets/Treaty Rights

The federal government has federal trust responsibilities to Native American Tribes. At meetings with the Shoshone-Bannock Tribes regarding federal trust responsibilities, the major issues pertinent to the S-CNF have been:

- Protection of big game winter range, especially for elk, moose, bighorn sheep, deer, antelope, and mountain goat;
- Protection of small game and mammals;
- Protection of resident indigenous and anadromous fish habitat;
- Access to traditional plant resources, such as, but not limited to, bitterroot, choke cherry, elderberry, current, red-twig dogwood (red willow), and lodge pole pine collection areas; and
- Unrestricted access for hunting, fishing, and gathering.

Few if any actual Traditional Use sites have ever been documented through consultation with the Tribes, owing to privacy issues. These are sites historically used by Tribes for traditional land uses such as hunting, fishing, gathering, ceremonial, and religious practices for which the Federal government has trust responsibilities to the Tribes. Federal consultation, described in *Chapter 5, Consultation and Coordination*, of this document, is essential to ensure that the federal government's trust obligations to the Tribes are met.

3.E.3. Environmental Justice

Executive Order 12898, issued in 1994, ordered Federal Agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. While the alternatives may have differing impacts on wildlife and fish, as described in Chapter 4 none of the alternatives would alter opportunities for subsistence hunting and fishing by Native American Tribes. Tribes holding treaty rights for hunting and fishing on the S-CNF were consulted during scoping and during the preparation of this document, and also had an opportunity to comment on the Draft EIS.

3.E.4. Socioeconomic Resources

Generally, the current state of the S-CNF is in relatively good condition. Weeds exist but not necessarily as a result of increases in social and economic activity. However, there is evidence of weed control activities affected by changes in the social and economic structure outside the S-CNF boundaries. A changing social and economic environment can be partially responsible for the increase of invasive weeds on private land and on the S-CNF.

The changes are assumed to be the result of a decrease in agricultural land and increased subdivision development, including residential and business development (Quigley and Arbelbide 1997). Because land use has changed significantly as this development replaces farm or rangeland along the S-CNF boundaries, the expansion of use (private recreational and commercial) within the S-CNF is also likely (Hirsch and Leitch 1996).

a. Population and Economy

The S-CNF lies mostly in Lemhi, Custer, and Butte Counties. There are four population centers in the area: Salmon (pop. 3,122), Challis (pop. 909), Mackay (pop. 566), and Leadore (pop. 90). Other towns include Clayton and Stanley (http://www.census.gov/prod/cen2000/). These areas have been traditionally dependent on natural resource extractive-based industries. This includes economies based on recreation and tourism industries. Additionally, most local communities have shifted in recent times to a more diversified, service-based economy.

b. Lifestyle

Natural resource amenity values attract people to this region, even when employment opportunities are limited. Earnings are lower here, compared with other parts of the country, reflecting a "quality of life" premium that people are willing to pay to live in this region. Hunting, fishing, outdoor recreation, and mushroom and berry gathering are all amenities that are part of this quality of life premium. Invasive weeds affect that "premium" by changing views and natural habitats.

The lifestyle of the region is also closely tied to S-CNF lands and surrounding property. Traditional resource-based activities such as mining, livestock ranching, and logging play an important role in the culture and values of the region. Tourism is also playing an increasing role in the economy of the region. Differing values about public land and its use may affect the way the public views noxious weed control on the S-CNF and preferences for the alternatives being evaluated.

c. Economics

The cost of treating the current weed invasion in Idaho is roughly estimated at 300 million dollars annually (Idaho Department of Agriculture 2002b). On the S-CNF, spotted knapweed has infested nearly 64,000 acres and accounts for approximately 96 percent of the total weed infestations. The true cost, in loss of habitat, rangeland, wildlands, and water and soil quality on the S-CNF is unknown; as a result, the economic impact of the current weed invasion on the S-CNF cannot be fully defined. However, the adverse effects on wildlife habitat, forage for grazing, and water quality because of noxious weed invasions have been documented throughout the state of Idaho (Idaho Department of Agriculture 1999), and generally described in previous sections in discussions of noxious weed effects on various biological and physical resources.

Economic research in Montana documents the economic effect noxious weeds—particularly spotted knapweed—can have on a resource-based economy. Because Montana's economy and environment is similar to that of the areas around the S-CNF, a short review of the Montana study (adapted from the U.S. Forest Service Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment, 2000a) is helpful.

Knapweed can displace native vegetation, reduce forage production, and diminish long-term rangeland productivity (Hirsch and Leitch 1996). Hirsch and Leitch (1996) estimate that invasive weeds cause an impact of $10.73 per infected rangeland acre (see also U.S. Forest Service, Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment 2000a).

Hirsch and Lietch also estimate the loss of recreational opportunities at $3.95 per infested wildland acre (see also U.S. Forest Service, Flathead National Forest Environmental Assessment 2000a). Wildlife is important to many outdoor recreation activities, including consumptive activities such as hunting and fishing, and non-consumptive activities such as wildlife watching and photography. Consumptive recreation expenditures include the purchase of guns and ammunition, licenses, guides, fees, gas, lodging, food, and other goods and services. Non-consumptive recreation expenditures include items such as camping equipment and photography supplies. The economic impacts that result from knapweed-caused changes to wildlands are decreases in wildlife- and recreation-associated expenditures.

Increased need to treat sediment and other materials in municipal systems can lead to increased costs of treatment in communities bordering National Forest lands. Similarly, the resource-based economy of the communities that use the S-CNF—or rely on recreational and other economic opportunities available—can face adverse economic results from continued noxious weed invasions.

Additionally, wildlands have non-market or intangible benefits, such as healthy resilient ecosystems. It is difficult to place an economic value on the threat that weeds pose to broad or local ecosystems and their proper function. These non-market benefits accrue to individuals as consumer surplus, are very difficult to quantify, and have no monetary or economic value to use in a comparison of possible management actions (U.S. Forest Service 2000b). However, the intrinsic or inherent value of these wildlands has been acknowledged, and the loss of these wildlands is often assessed a "contingent" value.

3.F. Cultural Resources

Cultural resources are generally defined as the nonrenewable evidence of human occupation or activity (as evidenced through sites, buildings, structures, artifacts, ruins, objects, works of art, architecture, or natural features) that were important in human history at the state, local, or national level. The S-CNF has a long history of human use. The Lemhi Shoshone Tribe traditionally inhabited the valleys of the Lemhi River until their removal to the Fort Hall Reservation in 1907. Euro-American explorers first entered the area in 1805; trappers followed, with permanent settlements beginning in the mid to late 1800s. Currently, the remnants of all of these uses provide a unique cultural resource.

3.F.1. Native American Historic Resources and Religious Concerns

The U.S. Government and its agencies have a unique relationship with federally recognized American Indian Tribes. As federal agencies undertake activities that may affect a Tribe's rights, property interest, or trust resources, they carefully implement those activities in a manner that respects the Tribe's sovereignty and resource needs. The federal agencies have

trust obligations to address effects to Tribal interests, rights, and property on reservations, and must disclose known effects through this NEPA process.

The S-CNF includes the aboriginal territories of various bands of Shoshone-Bannock peoples. The Lemhi Shoshone were known occupants of the Lemhi area and resided on the Lemhi Reservation until they were removed and consolidated into the Shoshone-Bannock Tribes of the Fort Hall Reservation. The Shoshone-Bannock Tribes have aboriginal treaty rights within the S-CNF. The Shoshone-Bannock Tribes continue to hunt, fish, and gather on unoccupied Federal lands such as the S-CNF. The Shoshone-Bannock Tribal government encourages maintaining and restoring all lands to healthy ecosystems. Suggested management philosophies include removing cultural features that degrade the ecosystem and allow the ecosystem to recover naturally. The policy of the Shoshone-Bannock Tribes for management of the Snake and Salmon River Basin resources suggests drastic efforts to restore the ecosystem only when past uses have degraded the area's ability to recover. The least intrusive restoration efforts should be used. Weed control efforts would have direct and indirect effects on these Tribal policies, since the alternatives all include some manipulation of the existing S-CNF ecosystem but with an overall goal of ecosystem restoration.

Tribal information about hunting, fishing, gathering, and religious use is closely guarded by Tribal members. The S-CNF watersheds provide important habitat for culturally significant species like salmon as well as traditional hunting opportunities. The Tribes also have rights to gather various plant species that occur on the S-CNF. Noxious weeds can affect these plant populations and contribute to habitat degradation. Because weed control efforts may affect these areas and Tribal uses of the S-CNF, government-to-government consultation will be a continuing process.

The Shoshone-Bannock Tribes have areas of religious and cultural concern, cemeteries, burial areas, and ceremonial areas; these locations are also confidential information. The Tribes have ethnographic history that encompasses these areas and continues to be significant to the Tribes.

The Nee Mee Poo National Historic Trail crosses S-CNF land. It traces the route traveled by bands of Nez Perce people in 1877 as they were pursued by the U.S. Army. The Nez Perce Tribe currently manages the gray wolf reintroduction program, but the Tribe has claimed no present interest east of the Middle Fork of the Salmon River.

3.F.2. Other Cultural Resources

Identified cultural resources consist of prehistoric villages, camps, rock shelters, pictographs, vision quest sites, hunting blinds, sweat lodge features, stone rings, talus pits, trails, springs, and cambium peeled pine trees. Historic resources stem from the mining camps and ghost towns to homestead and ranch cabin ruins. Several sites in the S-CNF are known locations and camps of the Lewis and Clark Trail. S-CNF buildings, bridges, landing strips, and trails also have historical significance. These areas are all vulnerable to noxious weed expansion as the historical activities altered the original ecological setting.

In order to comply with the National Historic Preservation Act, S-CNF archaeologists and heritage program managers will monitor and review site-specific project activities to ensure compliance. The Idaho State Historic Preservation Office (SHPO) reviews all proposed

undertakings and maintenance activities taking place within the S-CNF. Weed control efforts may potentially affect these historic structures and cultural locations, but preferred methods will avoid an effect rather than mitigate it.

3.F.3. Paleontological Resources

There are no known paleontological resources on the S-CNF, except for limited petrified wood locales. Presently available data suggest that the only significant paleontological sites are on nearby BLM, state, or private lands.

[illegible] [illegible] [illegible]

The [illegible] people. [illegible] [illegible] [illegible] [illegible]

[illegible] and [illegible] [illegible] directly [illegible] [illegible] [illegible] the Tribe [illegible] [illegible] [illegible] [illegible] more likely [illegible]. The [illegible] [illegible] [illegible] direct and [illegible] [illegible] [illegible] [illegible]

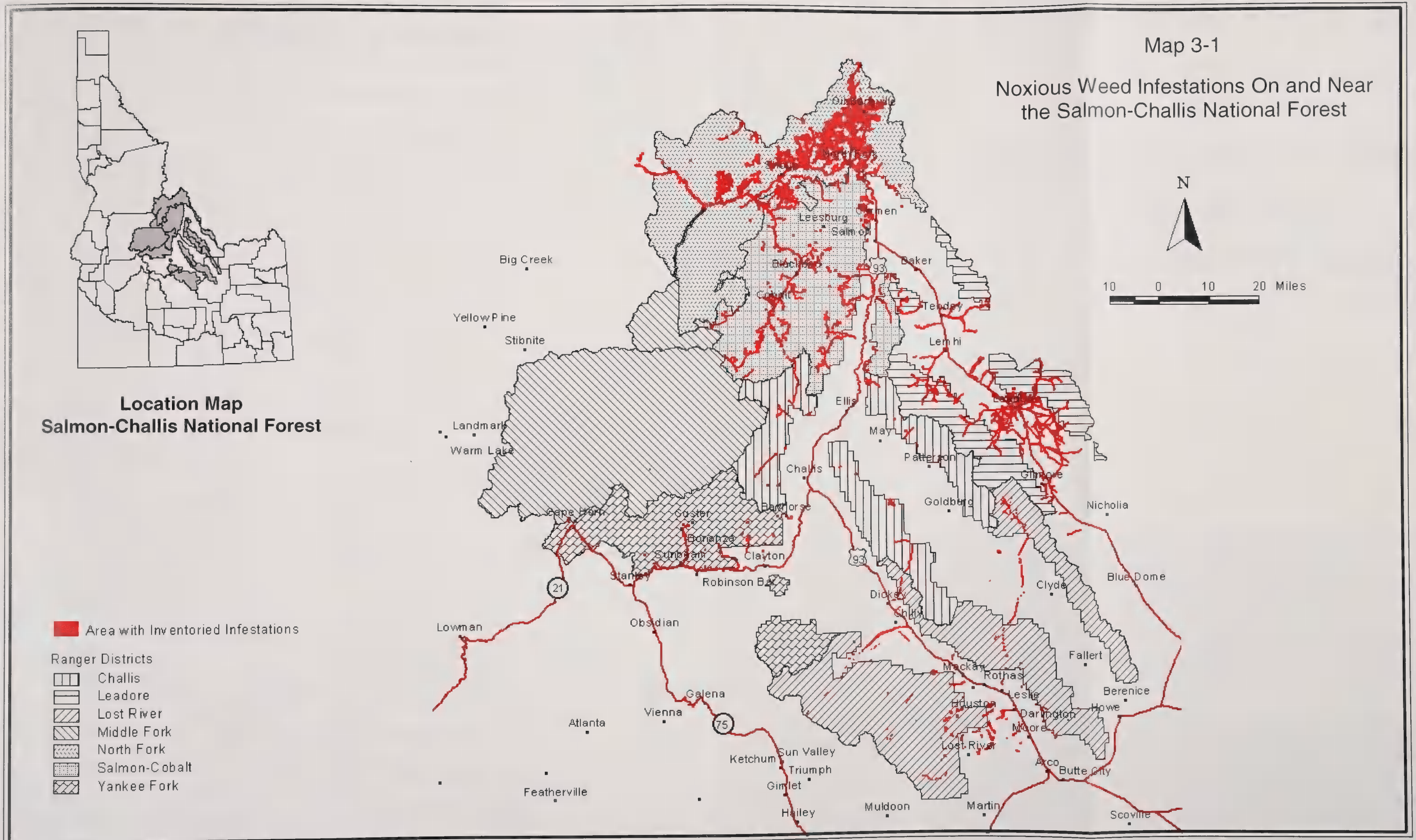
[illegible] religious are [illegible] guarded by [illegible] [illegible] culturally significant [illegible] [illegible] [illegible] [illegible] also have rights [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

The [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] significant [illegible] [illegible]

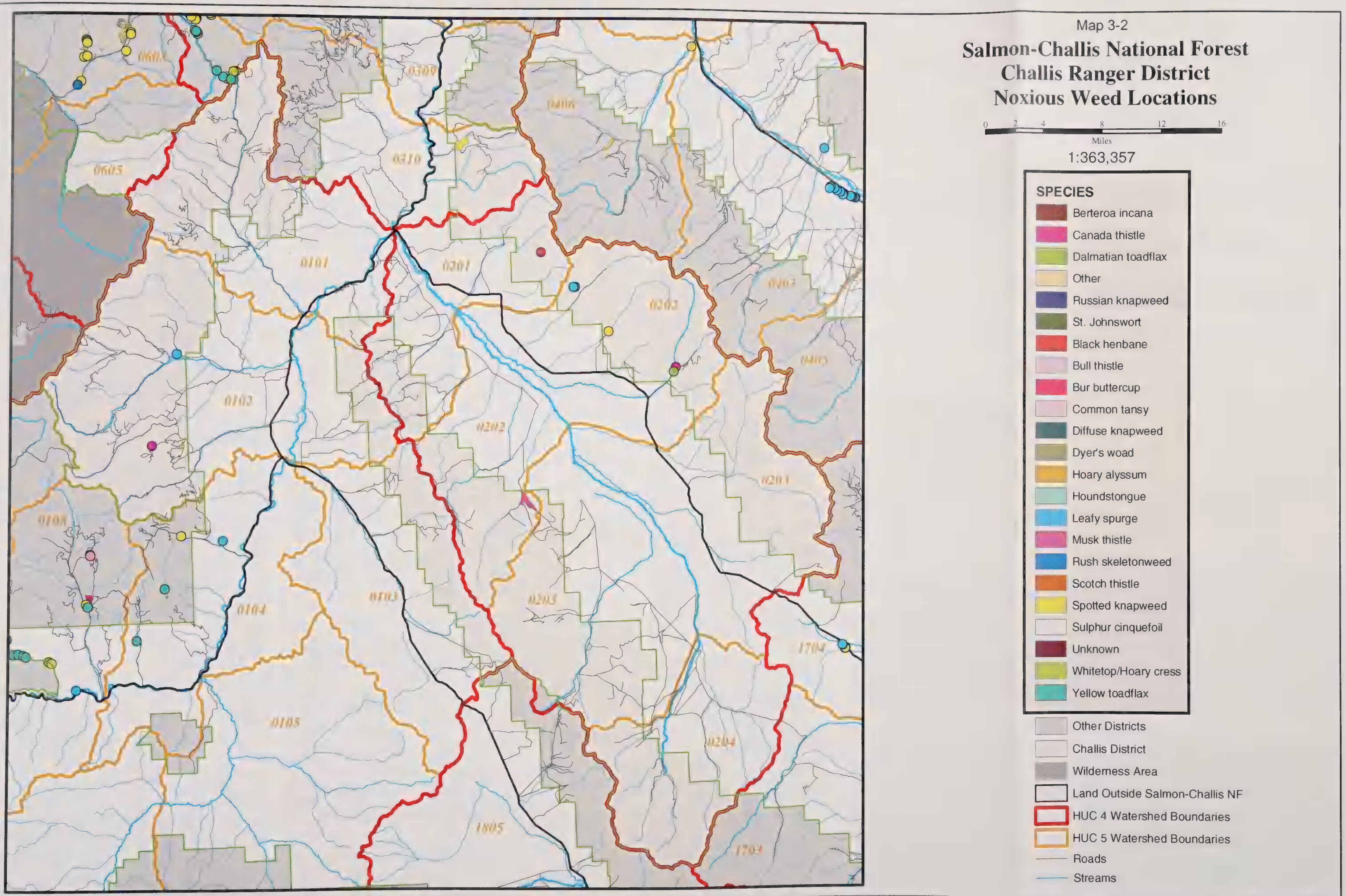
The [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] lands of [illegible] [illegible] [illegible] Tribe [illegible] [illegible] [illegible] the Tribe has [illegible] the [illegible] [illegible] [illegible]

3.F.2. Other [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]



Map 3-1
Noxious Weed Infestations On and Near the Salmon-Challis National Forest
N
10 0 10 20 Miles
Location Map
Salmon-Challis National Forest
Area with Inventoried Infestations
Ranger Districts
Challis
Leadore
Lost River
Middle Fork
North Fork
Salmon-Cobalt
Yankee Fork
Leesburg
Salmon
Baker
Tendoy
Lemhi
Big Creek
Yellow Pine
Stibnite
Landmark
Warm Lake
Ellis
May
Challis
Patterson
Gilmore
Goldburg
Nicholia
Clayton
Robinson Bar
Stanley
Lowman
Obsidian
Dickey
Blue Dome
Clyde
Fallert
Mackay
Leslie
Berenice
Howe
Darlington
Moore
Lost River
Arco
Butte City
Galena
Vienna
Atlanta
Ketchum
Sun Valley
Triumph
Gimlet
Hailey
Muldoon
Martin
Scoville
Featherville
21
75
93



Map 3-2
Salmon-Challis National Forest
Challis Ranger District
Noxious Weed Locations

C:\aaws\projects\weedcontractmaps\Challis.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 8:51:05 AM

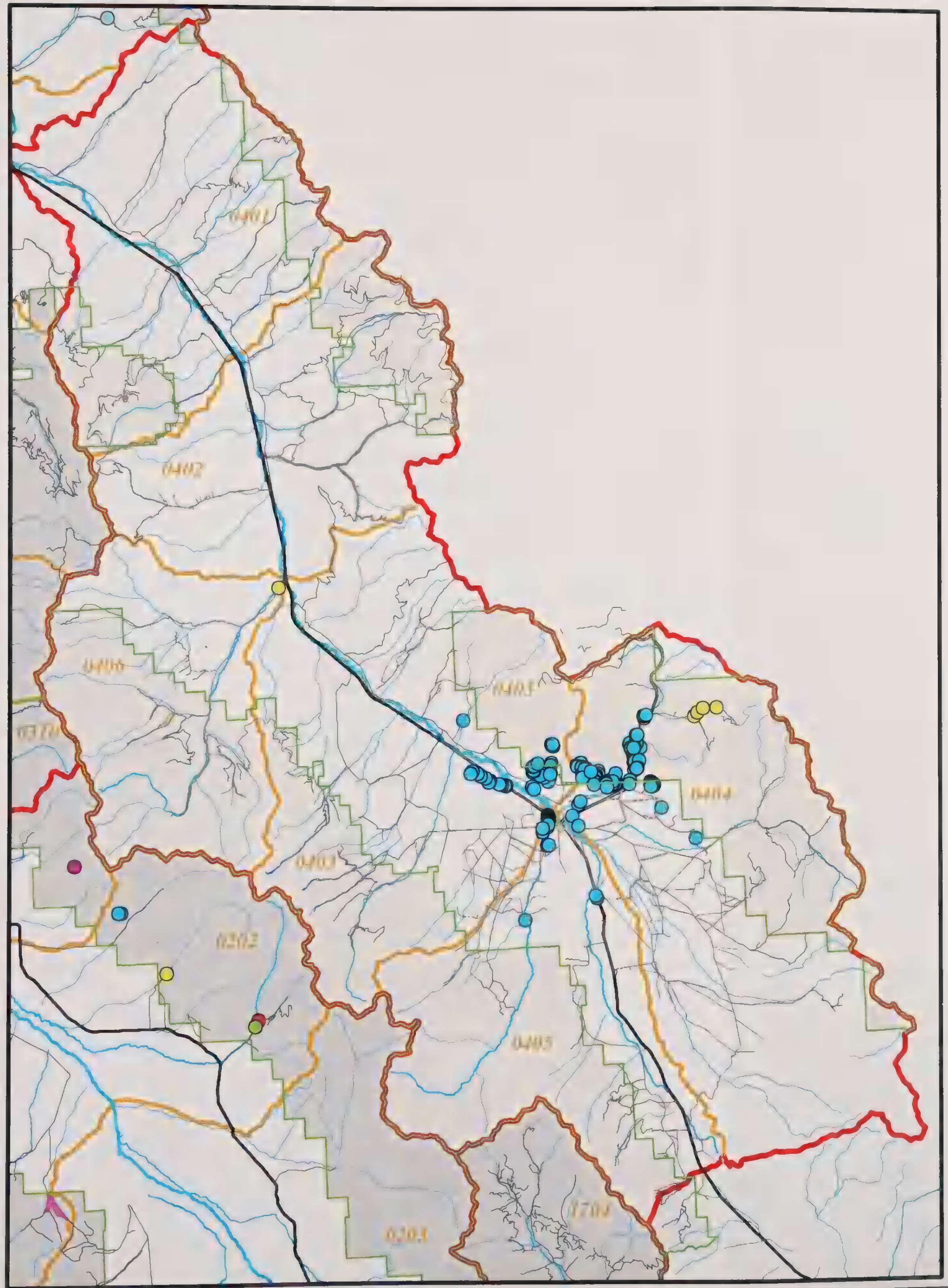
Map 3-3

Salmon-Challis National Forest
Leadore Ranger District
Noxious Weed Locations

0 2 4 8 12 16

Miles

1:394,953

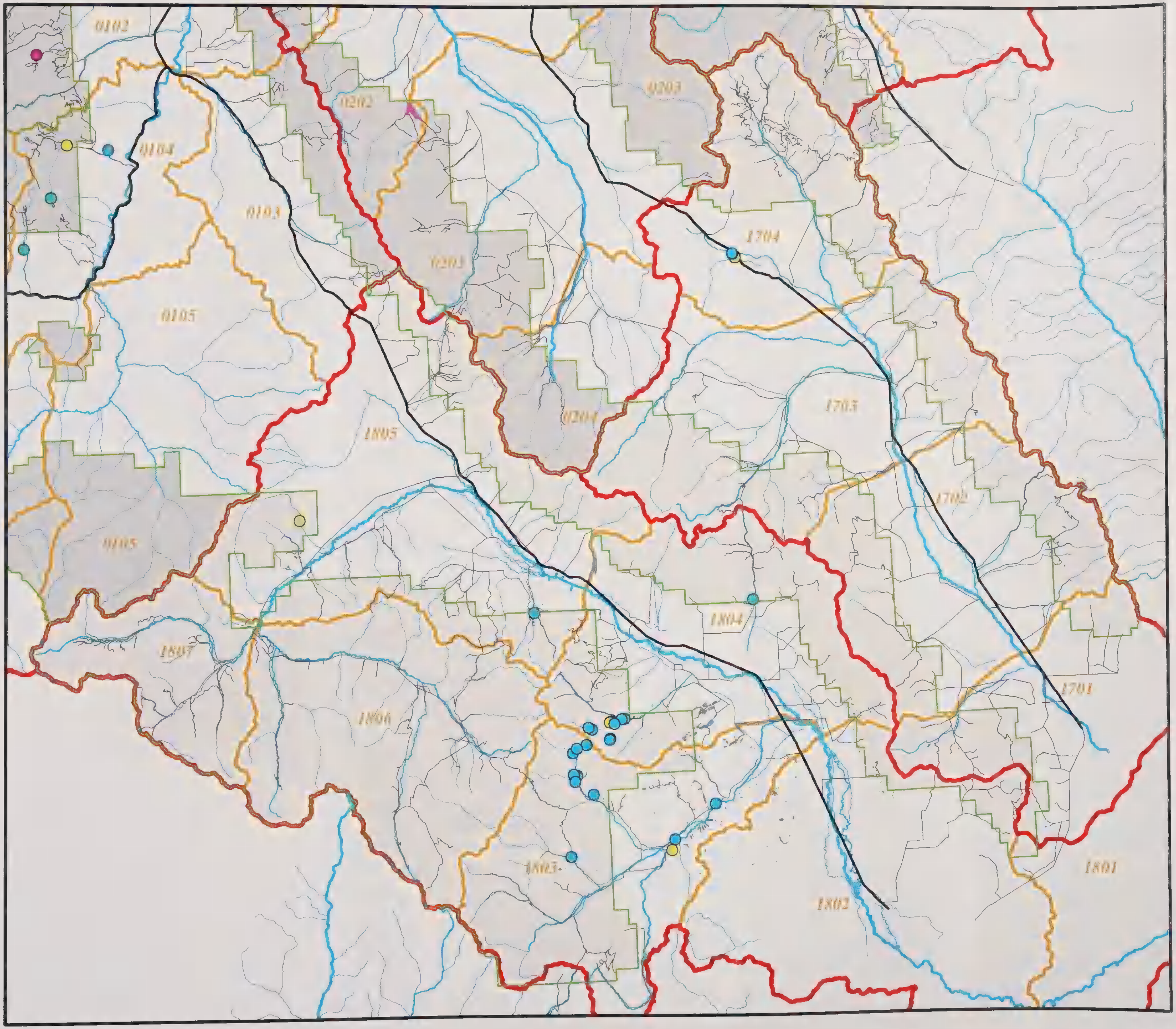


SPECIES

- Berteroa incana
- Canada thistle
- Dalmatian toadflax
- Other
- Russian knapweed
- St. Johnswort
- Black henbane
- Bull thistle
- Bur buttercup
- Common tansy
- Diffuse knapweed
- Dyer's woad
- Hoary alyssum
- Houndstongue
- Leafy spurge
- Musk thistle
- Rush skeletonweed
- Scotch thistle
- Spotted knapweed
- Sulphur cinquefoil
- Unknown
- Whitetop/hoary cress
- Yellow toadflax

- Other Districts
- Leadore District
- Land Outside Salmon-Challis NF
- HUC 4 Watershed Boundaries
- HUC 5 Watershed Boundaries
- Roads
- Streams

C:\aaws\projects\weedcontractmaps\Leadore.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 9:01:42 AM



Map 3-4

Salmon-Challis National Forest Lost River Ranger District Noxious Weed Locations

0 1 2 4 6 8
Miles

1:434,349

SPECIES

- Berteroa incana
- Canada thistle
- Dalmatian toadflax
- Other
- Russian knapweed
- St. johnswort
- black henbane
- bull thistle
- bur buttercup
- common tansy
- diffuse knapweed
- dyer's woad
- hoary alyssum
- houndstongue
- leafy spurge
- musk thistle
- rush skeletonweed
- scotch thistle
- spotted knapwed
- sulphur cinquefoil
- unknown
- whitetop/hoary cress
- yellow toadflax

- Other Districts
- Lost River District
- Land Outside Salmon-Challis NF
- HUC 4 Watershed Boundaries
- HUC 5 Watershed Boundaries
- Roads
- Streams

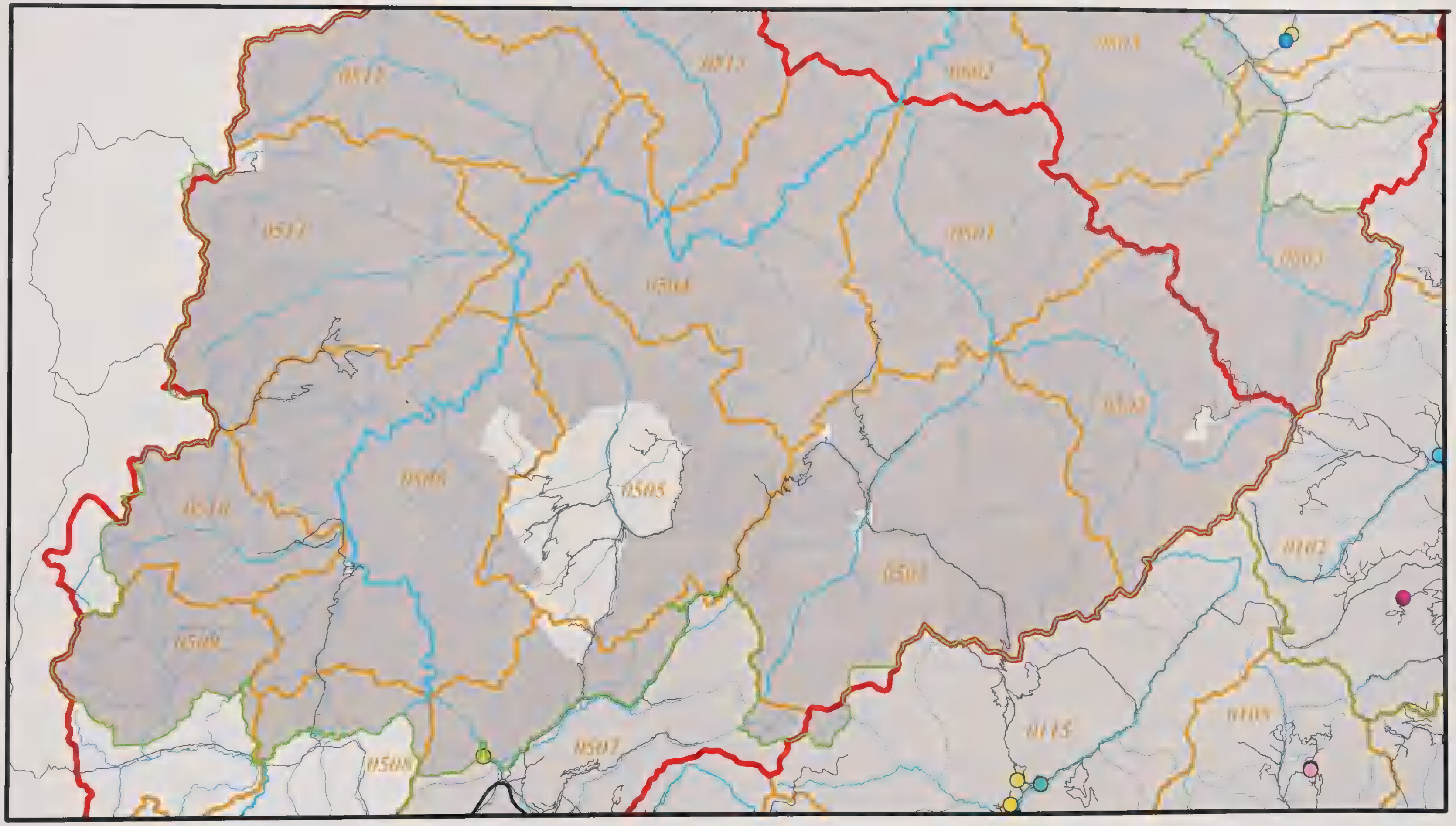
C:\aaws\projects\weedcontractmaps\LostRiver.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 9:29:58 AM

Map 3-5

Salmon-Challis National Forest
Middle Fork Ranger District
Noxious Weed Locations

0 2 4 8 12 16
Miles

1:363,357



SPECIES

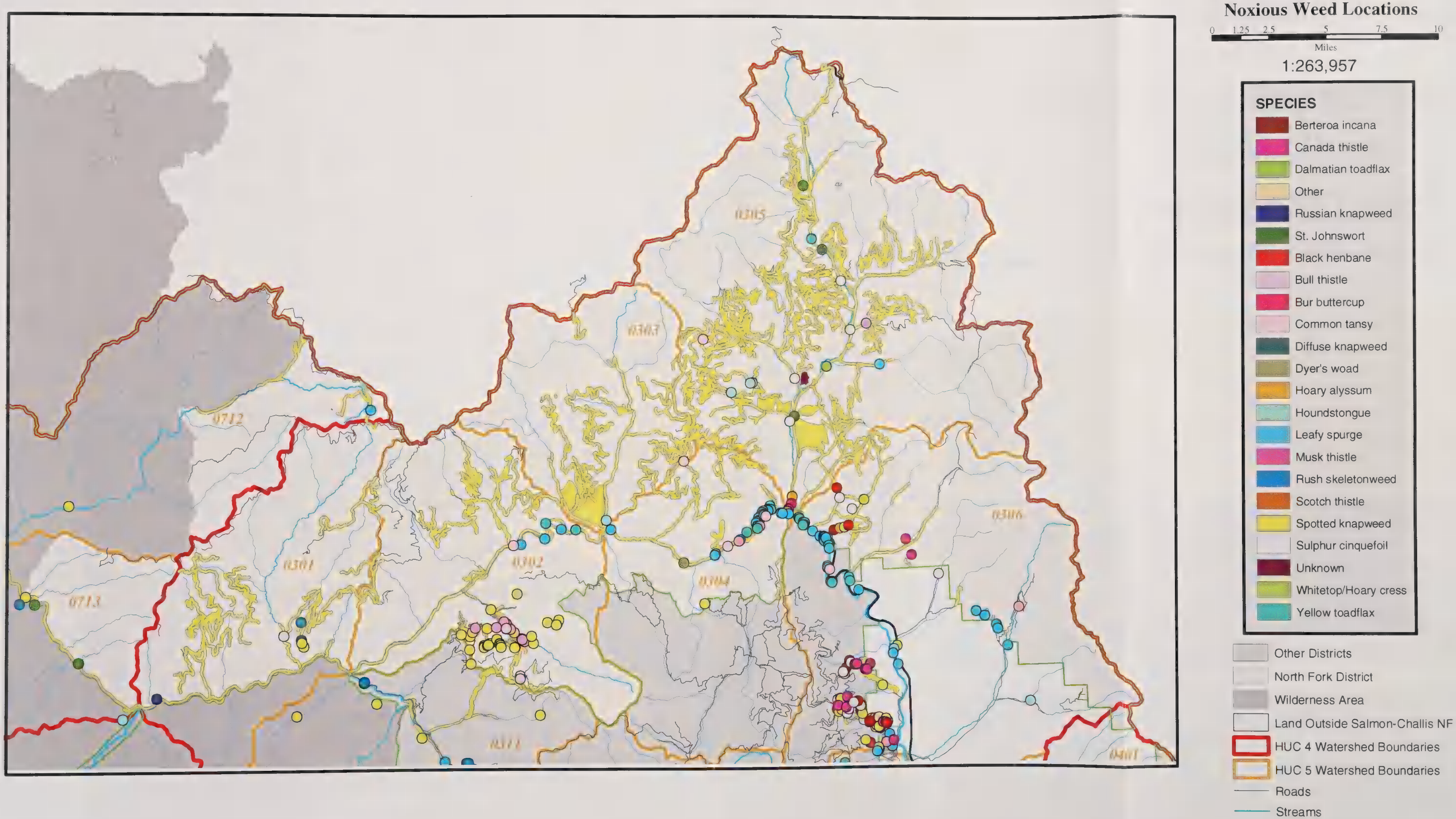
- Berteroa incana
- Canada thistle
- Dalmatian toadflax
- Other
- Russian knapweed
- St. Johnswort
- Black henbane
- Bull thistle
- Bur buttercup
- Common tansy
- Diffuse knapweed
- Dyer's woad
- Hoary alyssum
- Houndstongue
- Leafy spurge
- Musk thistle
- Rush skeletonweed
- Scotch thistle
- Spotted knapweed
- Sulphur cinquefoil
- Unknown
- Whitetop/Hoary cress
- Yellow toadflax

- Other Districts
- Middle Fork District
- Wilderness Area
- Land Outside Salmon-Challis NF
- HUC 4 Watershed Boundaries
- HUC 5 Watershed Boundaries
- Roads
- Streams

C:\aaws\projects\weedcontractmaps\MiddleFork.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 10:27:35 AM

Map 3-6

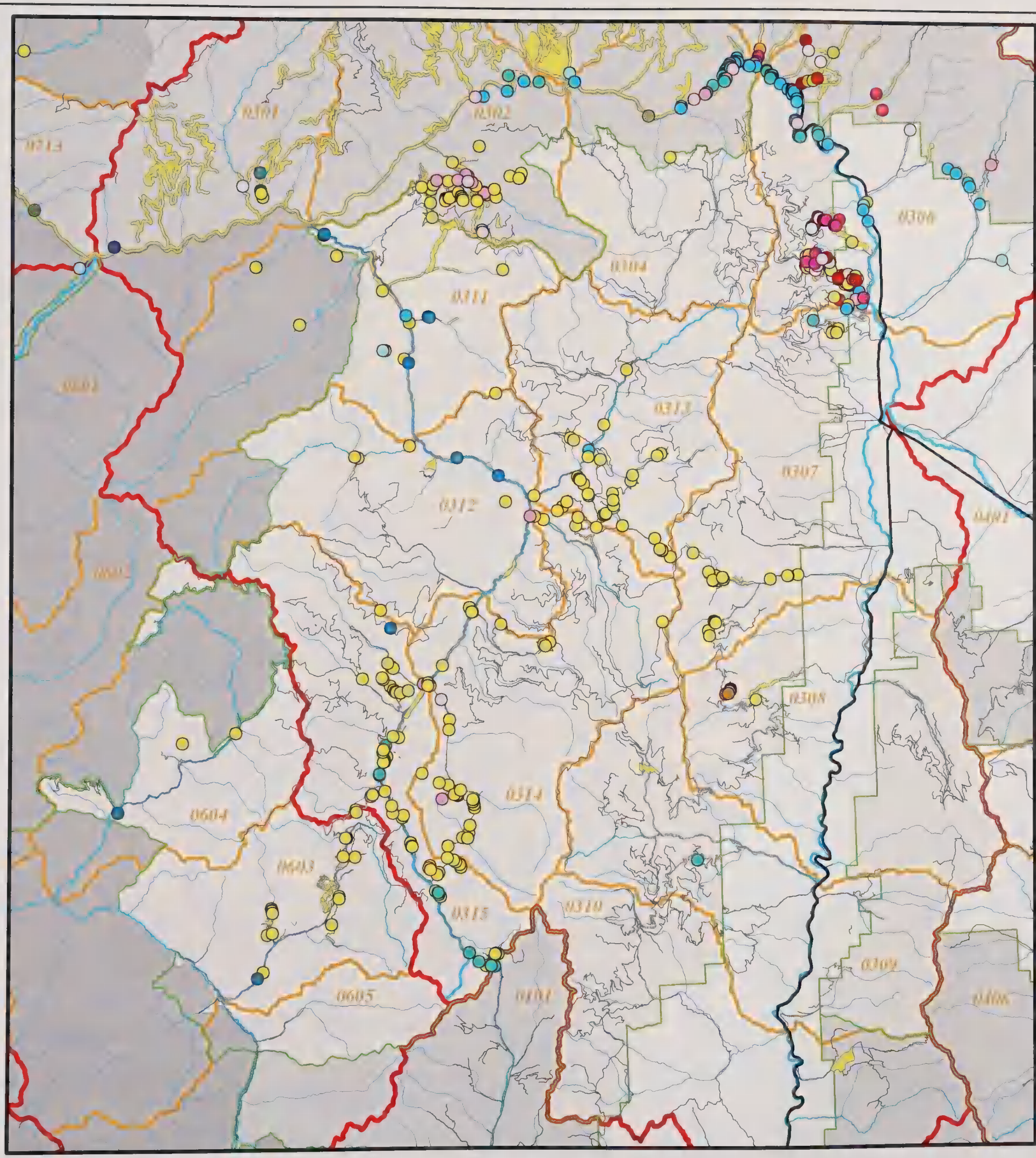
Salmon-Challis National Forest
North Fork Ranger District
Noxious Weed Locations



C:\aaws\projects\weedcontractmaps\NorthFork.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 10:34:27 AM

Map 3-7

Salmon-Challis National Forest
Salmon-Cobalt Ranger District
Noxious Weed Locations



0 1.5 3 6 9 12
Miles

1:308,557

SPECIES

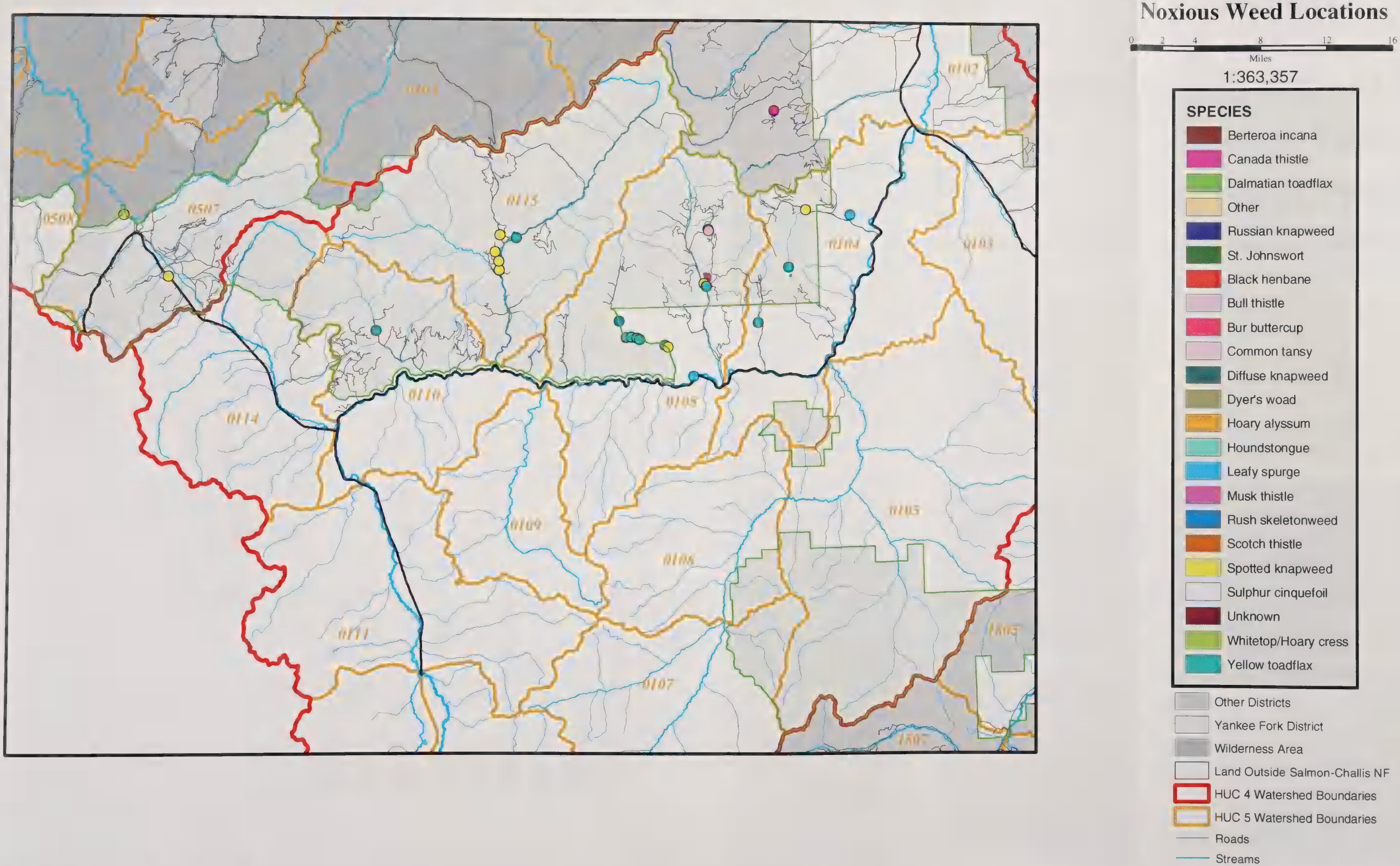
- Berteroa incana
- Canada thistle
- Dalmatian toadflax
- Other
- Russian knapweed
- St. Johnswort
- Black henbane
- Bull thistle
- Bur buttercup
- Common tansy
- Diffuse knapweed
- Dyer's woad
- Hoary alyssum
- Houndstongue
- Leafy spurge
- Musk thistle
- Rush skeletonweed
- Scotch thistle
- Spotted knapweed
- Sulphur cinquefoil
- Unknown
- Whitetop/Hoary cress
- Yellow toadflax

- Other Districts
- Salmon-Cobalt District
- Wilderness Area
- Land Outside Salmon-Challis NF
- HUC 4 Watershed Boundaries
- HUC 5 Watershed Boundaries
- Roads
- Streams

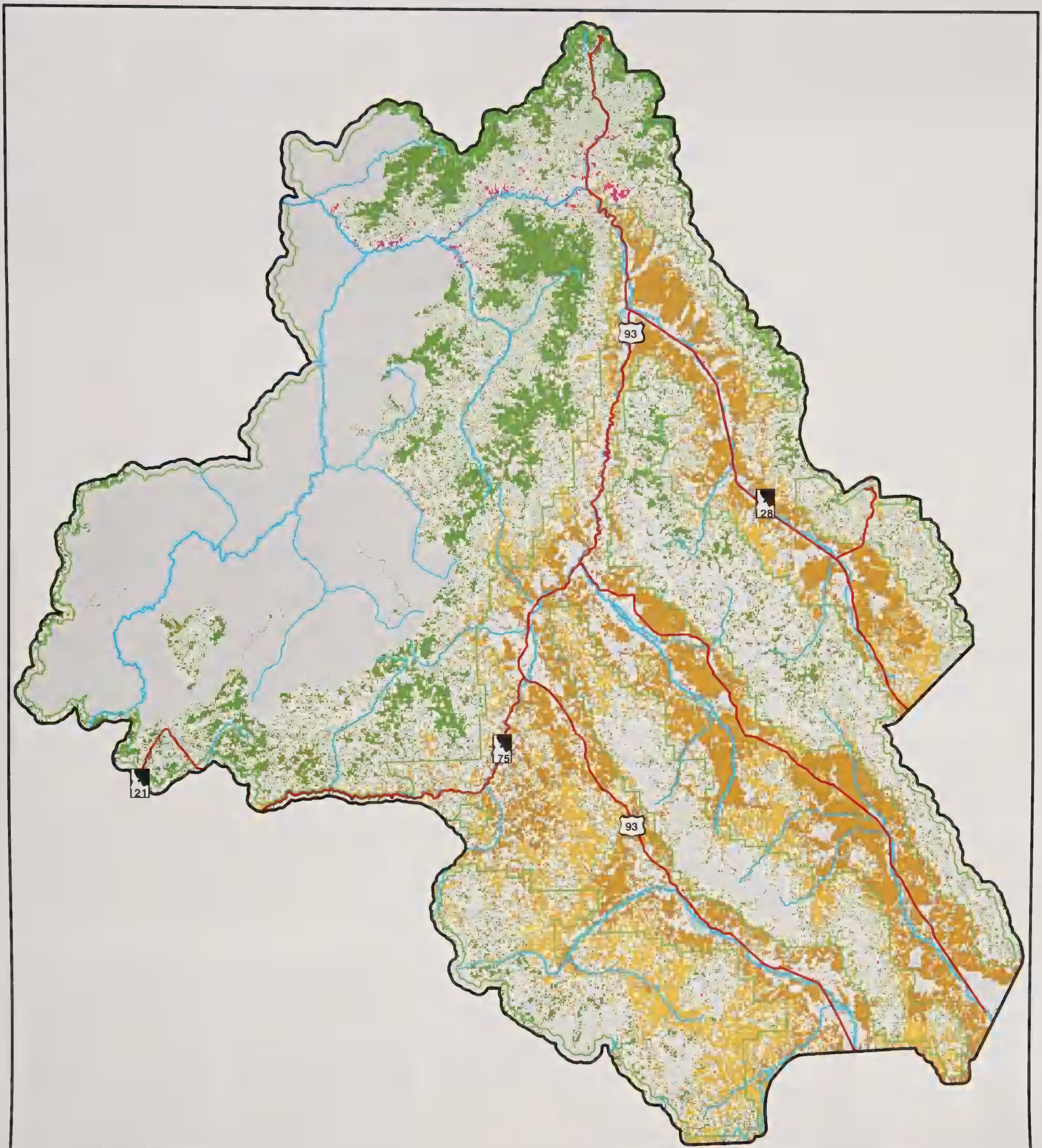
C:\aaws\projects\weedcontractmaps\SalmonCobalt.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 10:45:12 AM

Map 3-8

Salmon-Challis National Forest
Yankee Fork Ranger District
Noxious Weed Locations



C:\aaws\projects\weedcontractmaps\YankeeFork.mxd --- Created by Dale Hoskisson - SCNF --- 9/2/2003 11:14:45 AM



PVG Code

- 1 - Cool Shrub
- 2 - Dry Forest - Douglas Fir
- 3 - Dry Forest - Ponderosa Pine
- 4 - Dry Grass
- 5 - Dry Shrub
- 6 - Cold Forest
- 7 - Riparian
- 8 - Woodland
- 9 - Not Applicable

0 5 10 20 30 40

Miles

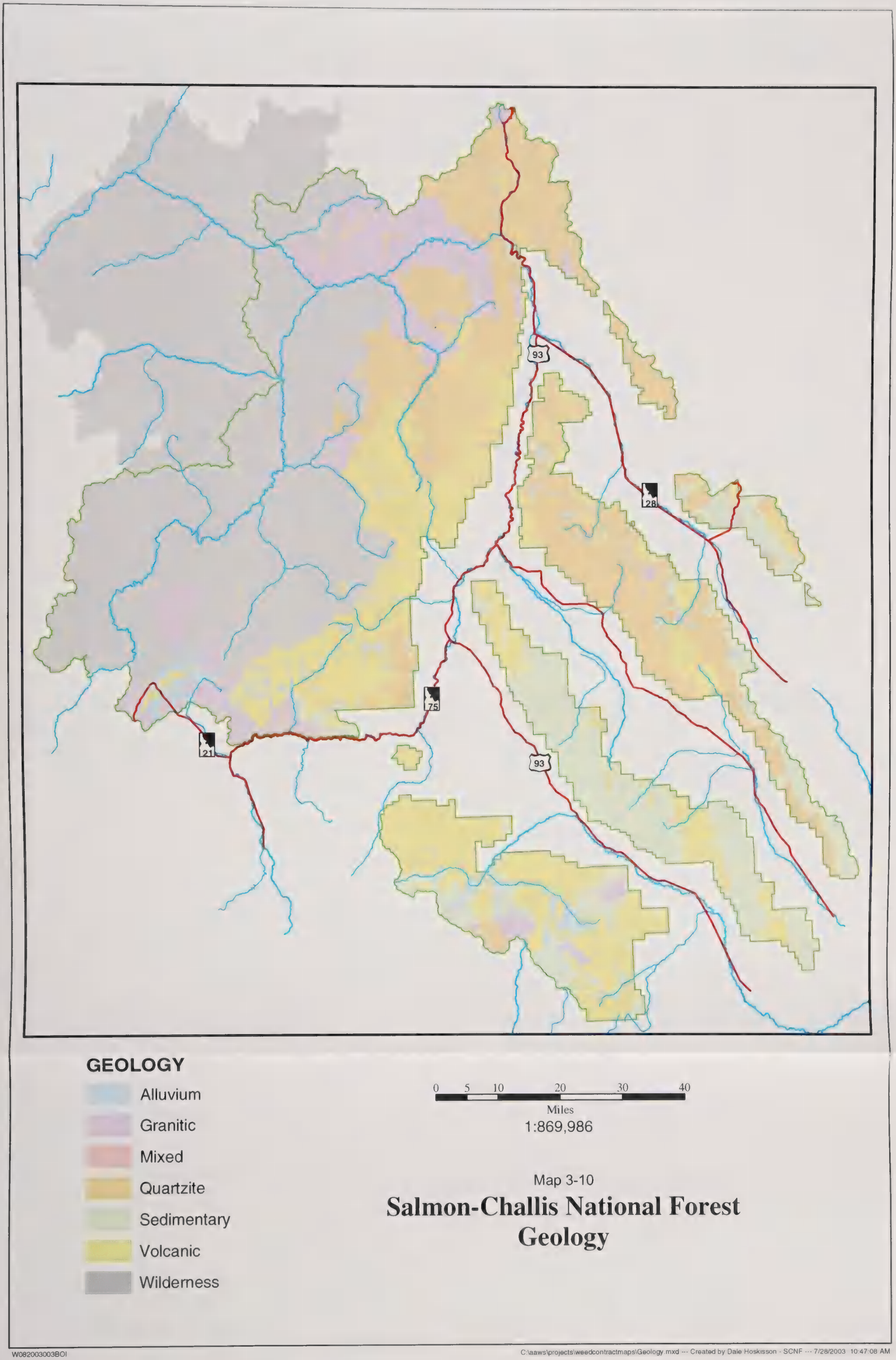
1:870,387

Map 3-9

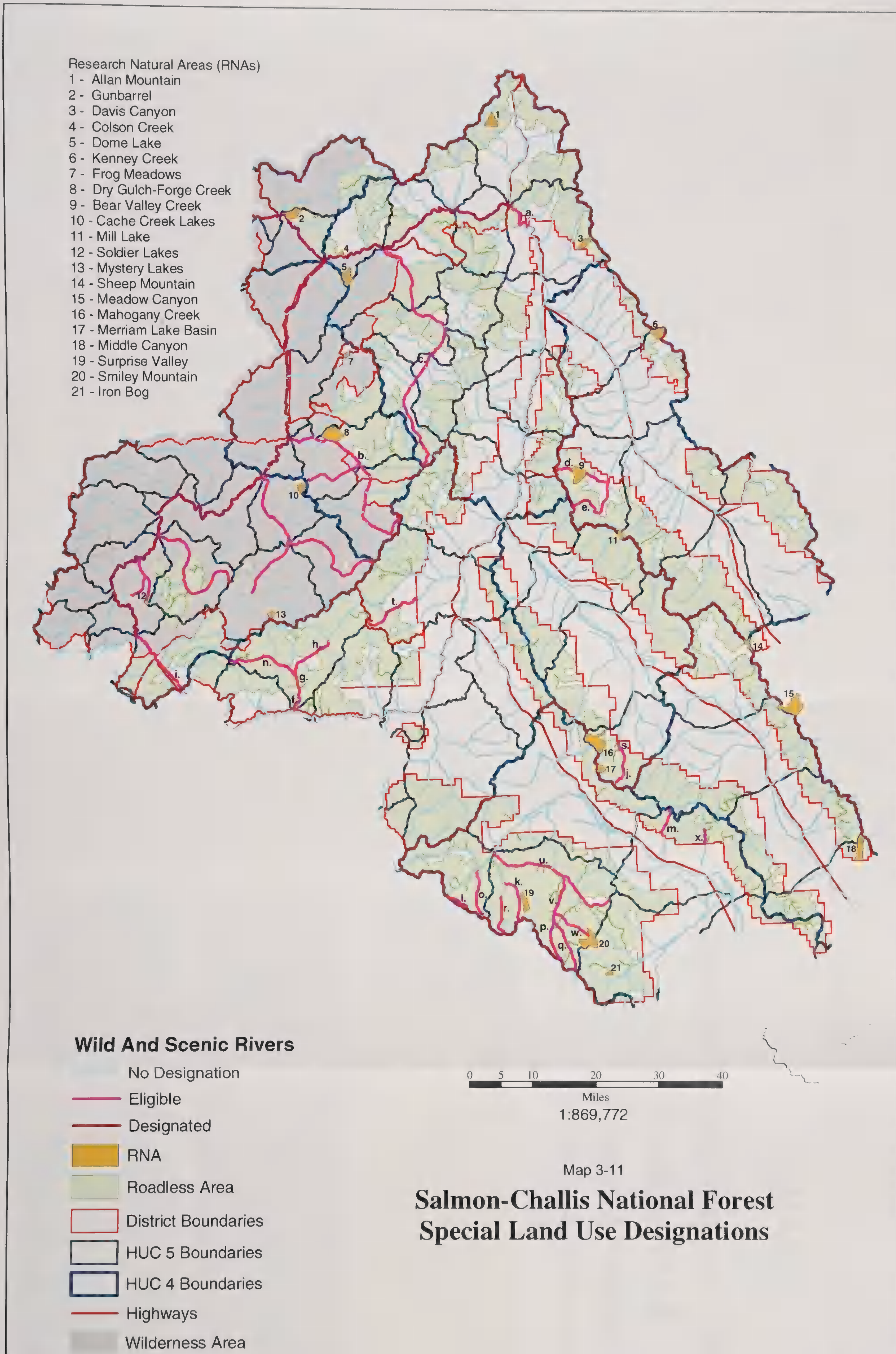
Salmon-Challis National Forest
PVG

W082003003BOI

C:\aaws\projects\weedcontractmaps\PVG.mxd --- Created by Dale Hoskisson - SCNF --- 7/28/2003 10:38:49 AM



93
28
75
21
93
GEOLOGY
Alluvium
Granitic
Mixed
Quartzite
Sedimentary
Volcanic
Wilderness
0 5 10 20 30 40
Miles
1:869,986
Map 3-10
Salmon-Challis National Forest
Geology
W082003003BOI
C:\aaws\projects\weedcontractmaps\Geology.mxd --- Created by Dale Hoskisson - SCNF --- 7/28/2003 10:47:08 AM



Map 3-11

Salmon-Challis National Forest
Special Land Use Designations

C:\aaws\projects\weedcontractmaps\Maps.mxd -- Created by Dale Hoskisson - SCNF -- 9/2/2003 8:41:24 AM

Chapter 4. Environmental Consequences

4.A. Introduction

This chapter describes the environmental consequences that would result from implementing the Proposed Action, one of the other action alternatives (Alternatives 1 or 2), or the No Action Alternative for the proposed S-CNF Noxious Weed Management Program. These alternatives were described in detail in *Chapter 2, Alternatives*. Impacts from the Proposed Action, Alternatives 1 and 2, and the No Action Alternative are evaluated and compared in terms of the effects on various resources resulting from the relative scope and intensity of weed treatment actions. The effects of weeds on the various resources also are addressed. The No Action Alternative is discussed first and provides an environmental baseline or benchmark for comparison to the Proposed Action and Alternatives 1 and 2. All issues identified during public scoping for the proposed project that are relevant to this Final EIS were considered in the impact analysis.

The impact analysis follows the same general outline for resources discussed in *Chapter 3, Affected Environment*. It addresses direct, indirect, and cumulative effects on those aspects of the physical, biological, and human environments most likely to be affected by the proposed project. Potential effects on threatened, endangered, and Forest Service sensitive species are described in *Chapter 4, Environmental Consequences*. They are also discussed in detail in a separate Biological Assessment that is submitted for review to the USFWS and the NMFS for federally listed endangered, threatened, and candidate species and in an appendix to this document (Appendix L, Biological Evaluation) for Forest Service sensitive species. S-CNF resources that are unlikely to be affected or only minimally affected are discussed only briefly in this chapter. This focus on potential substantive beneficial and adverse project effects provides a basis for comparing the alternatives and is consistent with CEQ guidelines for implementing the provisions of NEPA. The impact analysis also addresses project-related BMPs and mitigation measures that would be implemented as integral parts of the Proposed Action or one of the alternatives. BMPs and mitigation measures were described in detail in *Chapter 2, Alternatives* and are briefly referenced in this chapter.

The cumulative effects analysis considers the effects of the county weed control programs when combined with the effects of each alternative for the proposed S-CNF Noxious Weed Management Program. These sets of programs are closely related. Four CWMAs have developed weed control plans: Lemhi County CWMA, Custer County CWMA, the Lost Rivers (Butte and Custer Counties) CWMA, and the Continental Divide CWMA (including parts of Lemhi, Butte, Jefferson, and Clark Counties). An additional CWMA for the FCRONRW is being finalized, which will expand coverage in Custer and Lemhi Counties and also include portions of Idaho and Valley Counties.These projects develop cooperative weed control efforts among landowners in the counties, including the S-CNF, which participates in county weed control efforts as a member of the CWMAs. Each alternative described in this Final EIS would potentially be affected by, and affect, the treatment activities and success of the county weed control plans. It is assumed that future levels of weed treatment for each CWMA would be comparable to present levels. The cumulative

effects analysis also considers the potential effects of other ongoing, pervasive actions on the S-CNF, including livestock grazing, impacts from roads and trails, and recreation activities.

In addition, there would be positive cumulative effects in all alternatives from weed treatment activities described in this EIS when combined with the required treatment activities associated with ongoing Forest projects. These effects would vary by alternative and are difficult to quantify, but when both treatment actions are combined, their effectiveness in weed control and eradication would be enhanced.

This chapter concludes with discussions of the following subjects, as required under NEPA: comparison of the effects of the alternatives; probable adverse environmental effects that cannot be avoided; consistency with the S-CNF Forest Plan; possible conflicts with planning policies of other jurisdictions; relationship between short-term use and long-term productivity; and any irreversible and irretrievable commitments of resources that would occur if the Proposed Action or one of the other action alternatives is implemented.

The following assessment of potential impacts assumes that full funding and implementation of each weed treatment alternative will occur each year. It is also assumed for **purposes of analysis** that where one of several different treatment options could be implemented, the option that could potentially have the greatest impact on S-CNF resources would be used to treat weed infestations. These methods were described in *Chapter 2, Alternatives*. Unless used properly, the method generally considered to have the greatest potential for impacts is herbicide applications. These assumptions and approach to analyzing potential effects are believed to provide a worst-case analysis of the upper bounds of effects that could possibly occur on the S-CNF under each alternative. However, during actual program implementation at individual weed infestation sites, these conditions would very likely not occur because of the following reasons:

- Use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy described in *Chapter 2, Alternatives* would not result in worst-case conditions. These site-specific processes are designed to avoid or minimize the potential for adversely affecting S-CNF resources, especially sensitive resources.

- The extensive list of BMPs and mitigation measures described in *Chapter 2, Alternatives* that would be implemented as integral parts of the Proposed Action, other action alternatives or the No Action Alternative would avoid or minimize the potential for worst-case adverse effects to occur.

- Full funding may not be available every year to completely implement the alternative.

4.B. Biological Resources

4.B.1. Vegetation Resources and Noxious Weeds

The effects of weed treatment options on vegetation resources are extremely important. Vegetation resources considered under the Proposed Action and each alternative are: native plant community diversity, and threatened, endangered, and sensitive plant populations. The concerns for vegetation resources are intense because the results of doing nothing to stem the invasion of weeds are likely to be worse in the long term than the most aggressive

treatment strategy. Biodiversity and plant species richness for native vegetation and plant communities, wildlife habitat values, and sensitive species populations are likely to be severely compromised by the unchecked invasion of weeds. Similarly, these same vegetation resources could be compromised by unconstrained weed treatment efforts as well. The following discussion focuses on how these effects may differ among alternatives.

Wildlife habitat associations for S-CNF Species of Focus are based on PVGs. Vegetative group cover types that are currently most impacted by weed invasion will be the focus of most of the weed treatment regimes, no matter which alternative is being considered. These are also the cover types that have the greatest potential for habitat improvement if weed treatment regimes are successful. PVGs with the greatest potential for treatment impacts based on current weed invasion include all the Dry Shrub categories (Wyoming Big Sagebrush/Bluebunch Wheatgrass Cover Types; Threetip Sagebrush/Idaho Fescue/Antelope Bitterbrush Cover Types; Black Sagebrush Cover Types; and Low Sagebrush Cover Types); all of the Dry Grass Categories (Bunchgrass Cover Type and Fescue Grassland Cover Type); the Dry Forest Types (Douglas-fir/Idaho Fescue Cover Type and Ponderosa Pine Grassland Cover Type); and the riparian and woodland categories. The remaining PVGs are expected to experience somewhat less impact from noxious weed treatment. Although the following discussion focuses on how effects to vegetation may differ among alternatives it does not specifically address individual Vegetation Groups because the differences among alternatives is a result of treatment methods and because the need for treatment will remain relatively equivalent for all cover types among alternatives. *Section 3.C.1.c, Plant Management Indicator Species*, describes the plant management indicator species (MIS), how these species were identified as MIS, what they were selected to indicate, and where they occur within the PVGs. For similar reasons as stated above, the potential effects of the treatment options on the individual MIS will not be addressed in this analysis. Although five of the eight MIS were selected to indicate undesirable conditions, only the state-listed noxious weed Canada thistle is considered a target species for treatment. The potential for significant impacts is considered none on non-target grasses and minimal on non-target shrubs (see *Section 4.B.1.b, Vegetation Resources and Noxious Weeds: Proposed Action*). Resultant effects on wildlife associated with the different vegetation groups and cover types are discussed in *Section 4.B.3, Wildlife Resources*.

a. No Action Alternative

Direct and Indirect Effects. There are two important types of direct and indirect effects noxious and invasive weed infestations have on vegetation. First are the effects noxious weeds have on native plant community diversity and integrity when they invade an area. Second are the effects that treatments to remove noxious weeds may have on that same native vegetation.

Under the No Action Alternative, the current level of weed treatment would continue. Direct and indirect effects from noxious weed invasion would be expected to occur at the same or higher levels than currently.

The Forest Service (1999a) discussed the manner and rate at which weed infestations can spread, noting this can be much like the compounding of interest on money. They stated that certain vegetation types such as open grasslands, open river and riparian terraces and benches, and pine grasslands are more susceptible to invasion by spreading weeds than

other vegetation types such as forested slopes, timbered riparian zones, and dense shrub communities. The Forest Service (1999a) estimated the expansion of established noxious weed infestations into susceptible vegetation types on the FCRONRW using an average annual rate of weed spread of 17 percent, with variations between 14 and 24 percent annually depending on the species. Known spread rates for some noxious weed species are: spotted knapweed (24 percent); scotch thistle (16 percent); common tansy, sulphur cinquefoil, Dyer's woad, leafy spurge, and common mullein (14 percent); and rush skeletonweed (14 to 50 percent) (U.S. Forest Service 1999a).

Some of the same assumptions used to estimate weed spread on the FCRONRW were used to estimate future noxious weed spread on the S-CNF under the No Action Alternative. There are presently 66,537 acres of inventoried, known noxious weed infestations on the S-CNF (see Table 2-3, in Chapter 2).

- Annual rates of weed spread are based on acres of existing infestations on the S-CNF, not new starts or new invasions of weeds.
- Effects of major disturbances such as fires, landslides, and timber blow down on the rate of noxious weed spread are not included.
- Annual rates of weed spread under the No Action Alternative would average 17 percent, but could vary from 14 to 24 percent.

Data presented in Table 1-2 (in Chapter 1) indicate how quickly weeds could potentially spread and dominate the S-CNF under the No Action Alternative.

Herbicides and biological control treatments are the major weed control methods that would be used under the No Action Alternative. Under this alternative, the treatment rate of approximately 3,000 to 3,500 acres per year would likely continue. Treatment of noxious weed infestations has the potential to impact native plant communities, sensitive species, and wildlife habitats in a similar manner to the weed infestations. The use of biological controls is based on insect specificity to a given weed species. Ecologically, biological control is considered to have a fairly good track record as far as limiting damage to the target plant and not spreading to native plants (Turner 1985). Biological control use under the No Action Alternative would continue at the present rate and is unlikely to negatively impact native plants.

The treatment method with the greatest potential to negatively affect native vegetation under the No Action Alternative is the use of herbicides. Most herbicides have only limited selectivity and could potentially result in the loss of desirable vegetation that is growing with or near the targeted weeds. Current BMPs under this alternative are in place to ensure that such losses to native vegetation would be minimal. Additional BMPs listed in *Chapter 2, Alternatives* would specifically reduce negative impacts and the risk of losses to sensitive plant populations from noxious weed treatment. Therefore, when these BMPs are followed, there should be little or no direct effects on sensitive species from the treatment of weeds under the No Action Alternative.

There is the potential for minimal impacts to vegetation from off-road chemical treatment activities. Cross-country travel during weed treatment activities could be a limited source of

vegetation disturbance. Off-road travel in riparian habitat conservation areas (RHCAs) is not permitted.

Under the No Action Alternative, the effect of heavily weeded sites on watershed output, particularly on the northern districts of the S-CNF, would continue to be higher than if the weeds were eradicated and the sites were restored to native vegetation. Sites that are heavily infested with weeds tend to have reduced water infiltration and increased runoff when compared to sites with native vegetation (Olson 1999). Higher runoff would mean less soil moisture available for remaining native species. Knapweeds, which are the predominant noxious weed species in the northern region of the S-CNF, are considered by Roche (1988) to be the best regional symptom of desertification, the loss of the productive potential of the land. One of the five indicators for evaluating the susceptibility for desertification is the percent cover of exotic species compared to total cover (Mouat et al. 1993). Over time, reduced infiltration combined with increasing levels of weed litter will make plant seedling survival and natural regeneration of native vegetation less likely. Soil temperature extremes on sites with heavy weed infestations are also likely to occur, compounding the detrimental effects of less soil moisture and more weed litter and noxious weed seeds in the seed bank. Soil temperature fluctuations, caused by lower soil water content, poor soil aggregation, and greater exposure of bare soil to direct sunlight (Jones 1983; Monteith and Unsworth 1990), impact germination rates of native plant species not adapted to such changes. Other potential indirect effects include the potential for some weeds, such as cheatgrass (*Bromus tectorum*), to increase fire frequency. If infested sites are not restored and if weeds continue to expand as predicted under this alternative (Table 1-2), the historic fire cycle may increase on sites with cheatgrass to carry the fire. Other types of weeds may have the potential to increase fire frequency as well because they have the same characteristics of thick, uninterrupted canopy to carry fire and early seasonal drying. If fire frequency or intensity increases beyond the capacity of native vegetation to recuperate, the ecological integrity of the site would be lost. Additional indirect affects from weed treatment could occur on grazing use areas. Grazing use areas that have been treated may be rested from grazing for a period of time if necessary for site restoration purposes. This could indirectly affect vegetation on other use areas if they are grazed more than usual.

The heaviest deterioration to native vegetation under the No Action Alternative would be expected to occur adjacent to present weed populations in shrub-steppe habitats, and in ponderosa pine and dry Douglas-fir forests on the northern Ranger Districts of the S-CNF, particularly after disturbances such as wild fire or logging. Severe levels of deterioration continue under this alternative as desirable native grasses, forbs, and shrubs are replaced by weed species.

BMPs and Mitigation Measures. BMPs and mitigation measures for weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on the S-CNF to native vegetation. These focus on weed prevention and management and on the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples include compliance of all invasive weed treatment activities with State and Federal laws and agency guidelines and application of all chemicals in accordance with EPA registration label requirements.

Cumulative Effects. Adverse cumulative effects on vegetative resources on the S-CNF under the No Action Alternative may accrue from weed management treatments on

adjacent lands if spray drift from herbicide application on those lands settles on non-target vegetation on the S-CNF. Adjacent lands include the FCRONRW, lands managed by the BLM, and state and private lands within Lemhi, Butte, Custer, and Blaine Counties. CWMAs include coordination with the S-CNF in their management plans, so additional effects on the S-CNF from vegetation treatment outside the S-CNF boundary are unlikely. These CWMAs have met with some success at halting the exponential spread of noxious weeds. Therefore, cumulative beneficial effects on noxious weeds resulting from treatments under the No Action Alternative together with treatments under the three CWMAs would generally be expected to result in some localized eradication, control, and containment of noxious weeds. However, under the No Action Alternative, the spread of weeds on the S-CNF would be expected to continue expanding into native plant communities at approximately the current rate (Table 1-2). This overall effect on noxious weeds and native plant communities would reflect large-scale limitations on being able to eradicate, control, or contain new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, or to prevent or reduce the risk of the invasion of adjacent land by weeds presently occurring on the S-CNF. The effects of other ongoing activities on the S-CNF, such as heavy recreational use, livestock grazing, impacts from the construction, maintenance, and use of roads and trails, and possibly wild fires and logging, also may disturb or result in localized reductions in some native plant communities.

Additional adverse cumulative effects on vegetation resources could accrue from livestock grazing sprayed use areas or from recreational pack animal use. Other cumulative effects could occur from disturbance to vegetation caused by logging and other recreational uses. Combinations of localized disturbances with weed treatment may overwhelm the ability of native vegetation to adequately recover, thus providing further opportunities for weed infestation. The potential for these effects to occur is minimal under the No Action Alternative.

b. Proposed Action

Direct and Indirect Effects. The potential for adverse direct and indirect effects on native vegetation, sensitive plant species, and wildlife habitat integrity as a result of noxious weeds on the S-CNF would be expected to decrease under the Proposed Action compared to the No Action Alternative. The Proposed Action would treat much higher acreages of noxious weeds than are presently treated or would be treated under the No Action Alternative. The Proposed Action includes a blend of weed treatment methods, followed by site restoration, where appropriate, as described in *Chapter 2, Alternatives*. This combination of treatment and site restoration is designed to aggressively eradicate, control, and contain weed species on the S-CNF and to restore areas following treatment so that they would have a greater potential to avoid or minimize reinfestation. Under the Proposed Action, the reclamation and restoration of treated sites to native or acceptable vegetation would be a valuable addition to hold sites from reinfestation. Beneficial effects expected to occur with implementation of the Proposed Action are: 1) improve and restore the biodiversity of native vegetation, 2) restore quality habitat for wildlife, and 3) protect the integrity of ecological sites for sensitive plant species.

The Proposed Action has the most treatment options available for the IWM approach. Weed treatment methods that would be used include mechanical, biological, controlled grazing, aerial and ground-based herbicide applications, and combinations of these treatments. For

the Proposed Action, it is estimated (see Table 2-6, in Chapter 2) that annually approximately 100 acres on the S-CNF would receive mechanical treatment, 2,600 acres would receive biological treatment, and 100 acres would receive a combination of mechanical and biological treatments. As mentioned under the No Action Alternative, the release of biological controls on noxious weeds should have no adverse effect on native vegetation or sensitive plant species. The biological controls target specific weeds as a host and would not move into native vegetation. The mechanical and combined mechanical/biological treatment of about 100 acres each of weeds may have some immediate disturbance to native vegetation but there should be little or no long-term adverse effects on native vegetation because of target species selectivity. Possible surface disturbance from controlled grazing, which would be used in separate combinations with herbicides, mechanical treatment, and biological treatment on approximately 100 acres of weeds on the S-CNF under the Proposed Action, would be very minor and localized. The effects of controlled grazing followed by site restoration where appropriate would not adversely affect vegetation resources if grazing were carefully overseen and focused on the weed species. The project operation plan will be the source for specific livestock grazing use objectives and stipulations. If grazing were not carefully controlled, animals could choose to eat any remaining native species of grass and forbs in preference to most weed species, thus further negatively impacting native species.

There is the potential for minimal impacts to vegetation from off-road chemical treatment activities. Cross-country travel during weed treatment activities could be a limited source of vegetation disturbance. Off-road travel in riparian habitat conservation areas (RHCAs) is not permitted.

Under the Proposed Action, a total of approximately 1,300 acres on the S-CNF would be treated each year using a combination of mechanical, biological, and chemical methods. The number of acres treated annually would be less than the existing annual level of weed treatment (3,000 to 3,500 acres) on the S-CNF, where herbicides are the predominant treatment method used. It is unlikely that the combination of mechanical, biological, and chemical treatments followed by restoration where appropriate on 1,300 acres of weeds would adversely affect native vegetation on the S-CNF.

Approximately 13,600 acres of weed infestations on the S-CNF would be treated under the Proposed Action each year using a combination, or one or the other, of aerial and ground-based herbicide application. As noted above, herbicides also would be used in combination with mechanical, biological, and controlled grazing treatments to treat an additional 1,400 acres of noxious weeds on the S-CNF each year. Aerial herbicide application would be the most effective and aggressive treatment method for quickly accessing and treating large weed-infested areas. Treated areas would then be reclaimed and restored where appropriate. Aerial application has the greatest potential to harm native vegetation and sensitive plant species. For this reason, aerial spraying would not be used in areas with large amounts of native vegetation or in areas with populations of sensitive plant species. Areas that would be sprayed by this method would have site clearances completed for sensitive plants and for sites with high-quality native vegetation still intact, so they can be avoided. Many areas, particularly those in the North Fork Ranger District, are currently so heavily infested with knapweed that the benefits from aerial spraying and weed management would greatly enhance the potential for site restoration on a large scale. Protected and

sensitive native vegetation with narrow habitat requirements would especially benefit from improved habitat conditions in adjacent areas.

The potential for native shrub mortality is expected to be minimal where aerial applications are made, likely being limited to partial leaf drop of mature shrubs. However, unprotected seedlings and young plants could experience some mortality. Label application rates for shrubs are generally double that for perennial weedy forbs. In addition, label recommendations for target shrubs include thorough wetting of the entire plant, including the root crown. Such thorough wetting is not expected to occur under aerial applications.

Potential adverse effects from the herbicides used to control noxious weeds, particularly spotted knapweed, on native vegetation are an important consideration. Five herbicides are identified in Appendix C of this Final EIS that can be used to treat spotted knapweed, which is relatively easy to kill with herbicide. They include glyphosate, 2,4-D amine, clopyralid, dicamba, and picloram. All except glyphosate generally do not harm grasses when applied at recommended rates. Glyphosate is a non-selective herbicide so it could potentially kill all vegetation. Of the remaining four herbicides, picloram could potentially cause the greatest impact to native forbs. It has moderate to high persistence in the soil with reported field half-lives from 20 to 300 days and an average field half-life of approximately 90 days (Wauchope et al. 1992). Clopyralid is more selective at targeting knapweed than picloram, in that it mainly affects only legumes and composite species. It is important to note that all of these herbicides are non-selective to a large degree and will kill both native plants and weeds. This would have the effect of opening up more habitat for weed infestation. If non-selective herbicides are applied when knapweeds or other targeted weeds are still green, but native vegetation is completely inactive, there would be less potential for negative impact to native vegetation. Sometimes spraying in early spring or late summer can mimic these conditions as well, but unfortunately herbicides are generally most effective when applied from late May to early June during the peak and most rapid growing period or near peak soil moisture.

The Proposed Action has the potential to be the most detrimental to sensitive plant species because they are by definition not widespread or common. To avoid or minimize this potential, a site-specific implementation process, decision tree, and a minimum tool approach, which were described in *Chapter 2, Alternatives* would require sensitive plant assessments or field surveys prior to implementation of treatment activities. If sensitive plant species are found within a proposed treatment boundary, non-herbicide treatments would be considered as preferred methods. If the continued existence of the sensitive species was undermined by the noxious weed infestation, a herbicide would only be used to remove weeds in that area if it were hand applied to the weeds in order to avoid or minimize risk to sensitive plants.

After treatments have been implemented to remove weeds from a site, filling the open niche with native or approved vegetation through restoration activities where it has been determined necessary would be a crucial part of the Proposed Action. This restoration would consider a full diversity of plants, and it should rely on native plants that would be acclimated to the given site. Site restoration activities, such as seeding, transplanting, and fertilizing, would help ensure that weeds are permanently removed from treated sites. These restoration activities should have no long-term negative impacts on native vegetation or habitat because seeding and transplanting activities would involve only limited soil

disturbance. Fertilizer application rates would follow Forest Service and manufacturer guidelines.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on S-CNF resources including vegetation resources. A total of 59 management practices and mitigation measures address weed prevention and management BMPs and the proper application of herbicides, including 22 measures specifically directed at the proper aerial application of herbicides. All of these measures are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Examples include: all aerial treatment areas will be assessed or field surveyed for sensitive plants prior to initial spraying; a 300-foot buffer zone flagged, mapped, and reviewed with the pilot will be maintained around sensitive plant populations for aerial herbicide applications; revegetation of any site within the treatment area with substantial soil disturbance or with inadequate native vegetation onsite to naturally reseed the area; equipment will be cleaned before entering S-CNF sites and before leaving weed treatment sites; no chemical will be applied directly to sensitive plant species during spot treatments and a 100-foot buffer will be maintained around known sensitive plant populations during broadcast treatments; and all weeds that are mechanically or hand excavated after flower bud stage will be bagged and properly disposed. In addition, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives.* These management tools are designed to consider site-specific resource conditions, including sensitive plant species, that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources.

Cumulative Effects. Cumulative effects on noxious weeds resulting from treatments under the Proposed Action together with coordinated weed management treatments on adjacent lands through the three CWMAs are likely to be highly beneficial to native plant communities. This benefit should be a direct result of increased success at halting the exponential spread of noxious weeds on the S-CNF through their widespread eradication, containment, and control, together with continued success on adjacent lands. Under the Proposed Action, the spread of weeds on the S-CNF and perhaps on those non-National Forest lands immediately adjacent to the S-CNF would be expected to decline. Potential cumulative adverse effects on native plant communities that were described for the No Action Alternative also may occur under the Proposed Action. These include the potential effects from increased grazing pressure on untreated use areas. Potential disturbance to native vegetation from heavy recreational use, the construction, maintenance, and use of roads and trails, wild fires, and logging could also decrease the ability of native vegetation to overcome the impacts from possible herbicide application, inadvertent herbicide drift, or mechanical weed treatments. These effects, should they occur, would likely be short term and minimal in scope.

c. Alternative 1

Direct and Indirect Effects. The potential for adverse direct and indirect effects on native vegetation, sensitive plant species, and wildlife habitat integrity as a result of noxious weeds on the S-CNF would be expected to decrease under Alternative 1 compared to the No Action Alternative. There would be no aerial spraying of herbicides under this alternative as

compared to the Proposed Action. This would mean that large acreages on the northern S-CNF would be difficult to treat except with biological controls. Herbicide could still be ground sprayed. Ground spraying could be used effectively to surround and contain large acreages, much like containment of wild fires, but treating large acreages with ground spraying would require a longer time frame. With the exception of aerial spraying, Alternative 1 would use the same remaining combination of treatments and site restoration as the Proposed Action: mechanical, biological, controlled grazing, ground-based herbicide applications, and combinations of these treatments. Benefits that improve biodiversity of native vegetation, improve habitat for wildlife, and protect the integrity of ecological sites for sensitive plant species could still be achieved, but it would take much longer than under the Proposed Action but less time than the No Action Alternative. It is likely that Alternative 1 may control the further spread of noxious weeds, but would either do little to eradicate large infestations currently in place or would reduce current infestations at such a slow rate that there would need to be constant efforts to control the spread of weeds from current sites.

For this alternative, weed infestations that could potentially receive aerial spraying under the Proposed Action would instead receive a combination of primarily biological and ground-based herbicide treatments. Other treatment options would remain essentially the same. Both biological control treatments and ground spraying can take longer to control weeds because of either time or possibly labor constraints. Ground-spraying of herbicides could have fewer impacts on native vegetation and sensitive plant species because there are greater possibilities of avoiding such areas with ground-based spraying than aerial spraying. Additionally, there is a higher probability that current, large weed infestations, especially inaccessible infestations, would never be eradicated and restored to native vegetation under Alternative 1.

BMPs and Mitigation Measures. BMPs and mitigation measures for weed management under Alternative 1 are designed to avoid or minimize the potential for adverse effects on the S-CNF to native vegetation. These focus on weed prevention and management and on the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* The BMPs are the same as the Proposed Action except there will be no aerial herbicide application and therefore less risk than under the Proposed Action of inadvertently adversely affecting native vegetation.

Cumulative Effects. Cumulative benefits of Alternative 1 on vegetative resources on the S-CNF when coupled with coordinated weed management treatments on adjacent lands through the three CWMAs are likely to occur. These benefits would not be expected to occur as rapidly as under the Proposed Action because of the absence of the aerial application of herbicides as a treatment option under Alternative 1, but they would be expected to occur more rapidly than under the No Action Alternative because more acres of weeds would be treated each year. These benefits should be a direct result of increased success at reducing the exponential spread of noxious weeds on the S-CNF, together with continued weed treatment success on adjacent lands. Adverse cumulative effects on vegetation resources associated with other ongoing activities or occurrences on the S-CNF (such as recreation, roads, trails, livestock, wild fires, and logging) and from weed treatment activities that were described for the Proposed Action also would occur under Alternative 1.

d. Alternative 2

Direct and Indirect Effects. The potential for adverse direct and indirect effects on native vegetation, sensitive plant species, and wildlife habitat integrity as a result of noxious weeds on the S-CNF would be expected to be greater than under the Proposed Action, Alternative 1, or the No Action Alternative. This alternative would use neither aerial nor ground-based spraying of herbicides which means that large acreages would have to be treated with mechanical or biological controls. Because fewer treatment methods are available for treating weeds under Alternative 2 and because it is only realistic to control or contain rather than reduce the size of weed infestations under this alternative (see discussion of management objectives for Alternative 2 in *Chapter 2, Alternatives*), it would take longer to achieve lesser levels of weed treatment success than under the Proposed Action or other alternatives. The effectiveness of mechanical and biological treatment options in the eradication, control, or containment of invasive weeds can be delayed from several months to several years while the establishment and expansion of weeds continues. The impacts from mechanical treatment to large acreages could be even more detrimental to native vegetation, especially if mechanical treatment consisted of the use of heavy equipment to mow, plow, or disk large acreages. This type of disturbance removes all vegetation, turns the weed seed bank over in the soil so germination rates are high, and leaves disturbed areas with a fertile place for noxious weed seeds to germinate. It would take much longer than either the Proposed Action, No Action Alternative, or Alternative 1 to reduce or eradicate large weed infestations currently in place, and probably is not possible given the management objectives that were described in *Chapter 2, Alternatives* for this alternative. Alternative 2 may even increase infestations of weeds if restoration seeding, where appropriate, after mechanical treatment either does not occur or is not successful at out-competing weed seeds. Such a slow rate of control would mean a long-term, constant effort to control the spread of weeds from current sites with mechanical means. No herbicide use under Alternative 2 would mean there is no possibility of inadvertently impacting native vegetation, wildlife habitat, or sensitive plant species from chemical drift, but it also means the impact from weed infestation to these same resource categories would be much more likely to occur than under the Proposed Action or other alternatives.

BMPs and Mitigation Measures. BMPs and mitigation measures for weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on the S-CNF to native vegetation. The BMPs are the same as the Proposed Action except there will be no herbicide application. Potential adverse impacts from herbicide application would not be a possibility under this alternative.

Cumulative Effects. Some of the same general kinds of beneficial and adverse cumulative effects on vegetation resources that were described for Alternative 1 would occur under Alternative 2. However, it would take longer to achieve a lesser level of weed containment, control, or eradication than under the Proposed Action, Alternative 1, or the No Action Alternative because of the absence of the use of herbicides under Alternative 2. The cumulative success from the coordinated treatments with the CWMAs would be greatly hampered without the use of herbicides. These long-term effects include the expected gradual decline or containment of noxious weeds in some areas and some resultant gradual benefits to native plant communities on the S-CNF. Resultant cumulative benefits to native plant communities would be much less than under the Proposed Action or other

alternatives. Adverse cumulative effects would be similar to those described for the Proposed Action and other alternatives including the potential effects from other ongoing S-CNF activities and occurrences on S-CNF vegetation resources. However, increased and widespread mechanical treatments could exacerbate and compound those impacts to vegetation in areas that are experiencing ongoing surface disturbing activities. There would be no potential for herbicide spray drift on non-target vegetation because chemical treatment would not occur under Alternative 2.

4.B.2. Aquatic Resources

a. No Action Alternative

Direct and Indirect Effects. The No Action Alternative means that there would be no change in current weed management efforts. As a result, the direct effects of noxious weeds on aquatic habitat conditions and threats to aquatic resources on the S-CNF under this alternative would not be significant. However, certain indirect effects would occur. For example, with the expected continued spread of noxious weeds under the No Action Alternative as described in *Section 4.B.1, Vegetation Resources and Noxious Weeds,* of this chapter, there would be an increased potential for short-term and long-term soil erosion and stream sedimentation at weed-infested sites. This can directly and indirectly adversely affect aquatic habitat and associated fish and aquatic invertebrate populations. These adverse effects would likely be greatest in the northern portion of the S-CNF in the North Fork and Salmon-Cobalt Ranger Districts where there are extensive infestations of spotted knapweed.

The Forest Service (1999a; 2001d) noted that the establishment of invasive weeds such as knapweed and sulphur cinquefoil within or adjacent to riparian habitats could increase overland runoff and sediment yield from such habitats, citing studies by Lacey et al. (1989) who reported a three-fold increase in sediment yield and a 50 percent increase in runoff at a knapweed-infested site compared to a non-infested site. Studies on the Lolo National Forest in western Montana showed that a site with 80 percent knapweed cover yielded five times the amount of sediment as sites covered with bunchgrass (Hickenbottom 2000, in U.S. Forest Service 2001c). These same studies estimated that the effects of a 20-minute thunderstorm (100-year event intensity) occurring on 1,648 acres of big game winter range infested with spotted knapweed could produce an additional 160 tons of sediment compared to a weed-free site.

Increased sediment delivery to drainages can directly and indirectly affect aquatic resources through the sedimentation of habitat and increased levels of turbidity and suspended sediment in the water column. Increased sedimentation can cause a reduction or elimination of stream bottom habitat used by aquatic insects such as caddisflies, mayflies, and stoneflies that are important fish foods; a subsequent reduction in aquatic insect abundance and diversity; a reduction in the permeability among interstitial spaces within spawning gravels that inhibits the flow of well-oxygenated water and the removal of metabolic wastes; a subsequent reduction in spawning success, hatching success, and fish production; and a reduction in the interchange of surface and subsurface waters in the hyporheic zone beneath the stream channel (Nelson et al. 1991). Substantially increased sedimentation can eliminate or reduce the depths of pools that provide important year-round cover for juvenile, sub-adult, and adult fish, and may cause the premature siltation of beaver ponds, which often provide year-round habitat for trout and different life stages of salmon and steelhead. If

severe enough, increased sediment loads can cause the erosion and migration of stream channels (Chamberlin et al. 1991), and the subsequent degradation of aquatic and riparian habitat.

Elevated turbidity and suspended sediment levels caused by increased sediment delivery can have sublethal and acute effects on fish. Nelson et al. (1991) reported that suspended sediment concentrations of 1,200 milligrams per liter (mg/L) cause mortalities in underyearling salmonids, while suspended sediment concentrations as low as 100 mg/L up to 1,000 mg/L are sometimes associated with a general reduction in fish activity, impaired feeding, reduced growth, downstream displacement, and decreased resistance to other environmental stressors. (A concentration of 1 mg/L equals 1 part per million or ppm.) Fish and fish food production can be affected by the abrasive effects of very fine sediment on fish embryos and fry and on immature aquatic insects. In addition, very turbid waters can exhibit increased temperatures because of the water's capacity to retain more heat. This can affect those fish and invertebrate species that have the most restrictive cold-water or cool-water thermal requirements.

The potential degradation or loss of riparian habitat from weed infestation can be especially important in smaller drainages because of the many direct and indirect influences riparian habitat has on the quality of aquatic habitat. Murphy and Meehan (1991) reported that riparian habitat can form a protective canopy that provides overhead cover for fish and moderates the extreme effects of air temperatures during summer (helps to cool streams) and winter (helps to insulate streams). Riparian habitat also helps reduce soil erosion and filters sediment before it enters streams, stabilizes streambanks, and allows for the formation of undercut banks that provide cover for fish. In addition, riparian habitat contributes litter (nutrients and food for invertebrates) and woody debris (instream cover) to drainages, and it provides habitat for insects that fall to the water's surface and are consumed by fish (Murphy and Meehan 1991).

Aquatic resources potentially impacted by the direct and indirect effects of increasing weed infestations on the S-CNF include all of the special status, rare, sensitive, introduced, recreational, nongame, and other MIS fish species described in *Section 3.C.2, Aquatic Resources.* Potentially at risk resources also include aquatic invertebrate species, such as pollution-intolerant MIS mayfly and stonefly taxa. The greatest potential for impacts from increased sediment delivery and possibly riparian degradation may be to the anadromous and native resident salmonids, especially protected, sensitive species such as bull trout, westslope cutthroat trout, and the Snake River steelhead, sockeye salmon, and spring/summer chinook salmon. These species have relatively narrow habitat requirements, including the need for clean, cold, well-oxygenated, interconnected water and/or gravels for spawning, egg incubation, rearing, migration, and/or adult success (Bjornn and Reiser 1991). Sensitive amphibians such as the Columbia spotted frog, western toad, and long-toed salamander that are associated with aquatic and riparian habitat on the S-CNF also may be affected by habitat degradation. Site-specific impacts from erosion and sediment delivery would depend on the slope, soil characteristics, precipitation amount and pattern, distance to water, riparian buffer health and extent, and the species and life stages present.

The application of herbicides and other weed treatment methods on the S-CNF would continue under the No Action Alternative at the current treatment rate of approximately 3,000 to 3,500 acres per year. There have been some limited monitoring activities on the

S-CNF to assess the impact of current herbicide application methods near aquatic resources. These activities showed that buffer zones were effective for existing application methods and showed no adverse impact on aquatic resources (Rose 2002). Results of monitoring activities on the S-CNF are summarized below.

Monitoring of herbicide applications was implemented on a test basis in the Spring Creek watershed of the S-CNF in 2002 (Rose 2002). This watershed has infestations of spotted knapweed, has been treated with herbicides in the past, and is a candidate for more extensive herbicide treatment beginning in 2003. Monitoring addressed the potential for offsite spray drift using spray cards, and analyzed water quality downstrem of the treatment site. Moisture-sensitive spray cards were placed along two transects perpendicular to the stream prior to sampling. Spray cards were located within the middle reaches of the treatment area, at points 50 feet and 25 feet from the water's edge, and at the near and far streambanks (Rose 2002). Width- and depth-integrated water samples were collected at a well-mixed point on the stream downstream of the treatment area immediately prior to and during treatment operations. Knapweed within the test site was hand sprayed with Weedar 64 (2,4-D amine) in a zone within 50 feet of the stream edge on July 9, 2002, and sprayed using a truck-mounted sprayer in areas outside of the 50-foot buffer zone with Tordon 22K (picloram) on July 10, 2002 (Rose 2002).

Post-spraying observations following herbicide applications in the Spring Creek watershed during 2002 indicated no evidence of spray drift on any spray cards during backpack spraying operations (Rose 2002). Truck operations produced a spray residue on cards located in the middle portions of the treatment area, but no residue was observed on the 50-foot cards, 25-foot cards, or any of the streambank cards. Analysis of water samples showed detectable levels of 2,4-D amine (0.17 microgram per liter) and picloram (0.04 microgram per liter) during backpack spraying, and a detectable level of picloram (0.02 microgram per liter) but not 2,4-D amine during truck spraying (Rose 2002). The monitoring report concluded that a flaw in the study design may have been at least partially responsible for the observed presence of herbicides in water samples collected during treatment operations. The report stated it was quite possible that downstream water samples, which were collected by field personnel wearing waders who had previously entered the sprayed area and then the creek, were contaminated by the coincidental collection of spray cards and downstream water sampling operations (Rose 2002). It is noteworthy that the detected levels of 2,4-D amine and picloram are substantially less than herbicide levels of concern for aquatic species shown in Table 4-1.

Analysis of the effects of herbicide application under the Proposed Action, which would occur over a greater area than the No Action Alternative and is presented in the following text (see *Section 4.B.2.b, Aquatic Resources: Proposed Action*), indicates that aquatic resources would not be impacted under the Proposed Action and supports the conclusion of no adverse effects on aquatic resources from herbicide application under the No Action Alternative. The Proposed Action analysis of herbicides considers several worst-case situations, examining the potential effects of applying different kinds of herbicides at different locations on the S-CNF in watersheds characterized by differing streamflows and soil characteristics (leaching and runoff potential). That analysis concluded that except for the possible accidental spill of a herbicide in a relatively small drainage, there would be no adverse effects on aquatic resources from the chemical treatment of weeds. Adherence to

BMPs and mitigation measures would reduce the likelihood of an accidental spill occurring. The same conclusion applies to the No Action Alternative. Treatment activities would continue to be implemented according to all of the BMPs and mitigation measures described for the No Action Alternative in *Chapter 2, Alternatives*. Therefore, it is unlikely that there would be adverse effects on aquatic resources on the S-CNF from the continued use of these weed treatments and rates under this alternative.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples include compliance with all State and Federal laws and agency guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; and use of label-approved aquatic formulations near open water. A 50-foot no-spray buffer zone will apply for broadcast or 'block' applications and a 15-foot buffer will apply for spot applications along all flowing water streams and ponded water bodies. Reduced buffer zones will be considered when using label-approved aquatic formulations (e.g., aquatic 2,4-D).

Cumulative Effects. Cumulative effects on noxious weeds resulting from treatments under the No Action Alternative combined with treatments under the three CWMAs would generally be expected to result in some localized eradication, control, and containment of noxious weeds. However, under the No Action Alternative, weed infestation on the S-CNF would be expected to continue to increase. This would reflect large-scale limitations on being able to eradicate, control, or contain new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, or to prevent or reduce the risk of the invasion of adjacent land by weeds presently occurring on the S-CNF. This cumulative effect could potentially adversely affect aquatic and riparian habitat and a range of protected and other aquatic species through cumulatively increased erosion and sediment delivery to drainages. Adverse cumulative effects on aquatic resources may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations.

Additional cumulative effects on aquatic resources associated with other ongoing activities on the S-CNF include the potential for erosion and sediment delivery from road and trail-related construction and maintenance activities, livestock grazing along drainages, and recreational activities adjacent to drainages. Also, cumulative effects on aquatic resources from weed treatment activities potentially include short-term increases in erosion and sediment delivery to drainages caused by mechanical treatments (soil disturbance) and chemical treatments (creation of barren ground caused by weed removal). These areas would be subject to erosion until native vegetation becomes re-established, after which time erosion and sediment delivery should be less than when weeds were present. This would represent an overall long-term cumulative benefit to aquatic habitat and resources. Finally, there is the possibility of herbicide application in adjacent areas (S-CNF and CWMA) and possible cumulative effects on aquatic resources. However, the CWMA efforts are

coordinated with the management agencies to avoid multiple treatments within a defined geographic location. In addition, all such applications would be in accordance with EPA label guidelines, which are designed to protect aquatic organisms.

b. Proposed Action

Direct and Indirect Effects. The potential for adverse direct and indirect effects on aquatic and riparian habitat and species resulting from noxious weeds on the S-CNF would progressively decline under the Proposed Action compared to the No Action Alternative. The Proposed Action includes a blend of weed treatment methods, followed by site restoration, designed to aggressively eradicate, control, and contain weed species on the S-CNF and to reclaim disturbed areas following treatment. The likelihood of increased erosion, surface runoff, and sediment delivery to drainages, possibly resulting in riparian and instream habitat degradation and impacts to aquatic resources, would decline as weed-infested areas are treated and reclaimed. This would result in improved aquatic and riparian habitat conditions and reduced threats to all aquatic species on the S-CNF compared to existing conditions and the No Action Alternative. Benefits may be greatest in the northern portion of the S-CNF where substantial reductions in spotted knapweed infestations could potentially benefit aquatic habitat and numerous aquatic species. Benefits would be especially important to salmonids with narrow habitat requirements of clean, cold, connected, and complex water, such as bull trout, westslope cutthroat trout, and the Snake River steelhead, spring/summer chinook salmon, and sockeye salmon, and could contribute to the recovery and well-being of these protected and/or sensitive species. Riparian benefits would be especially important to amphibians such as the Columbia spotted frog, western toad, and long-toed salamander.

Weed treatment methods that would be used under the Proposed Action include mechanical, biological, controlled grazing, aerial and ground-based herbicide applications, and combinations of these treatments. For purposes of this analysis, it was estimated in *Chapter 2, Alternatives* (see Table 2-6) that each year under the Proposed Action approximately 100 acres on the S-CNF would receive mechanical treatment, 2,600 acres would receive biological treatment, and 100 acres would receive a combination of mechanical and biological treatments. The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. However, these effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. The release of biological controls on noxious weeds should have no adverse effect on aquatic resources. The biological controls target specific weeds as a host and would not compete for food with aquatic organisms, but they may provide an incidental food source for fish where weed infestations occur near drainages. The combined mechanical/biological treatment of about 100 acres of weeds should have no adverse effects on aquatic habitat or species. Possible surface disturbance from controlled grazing, which would be used in separate combinations with herbicides, mechanical treatment, and biological treatment on approximately 100 acres each of weeds on the S-CNF under the Proposed Action, would be very minor and localized. The effects of controlled grazing, which would be conducted according to stipulations in a project operation plan, followed by site restoration (where appropriate) would not adversely affect aquatic resources.

A total of approximately 1,300 acres on the S-CNF would be treated each year using a combination of mechanical, biological, and chemical methods. The number of acres treated annually would be less than the existing annual level of weed treatment (3,000 to 3,500 acres) on the S-CNF, where herbicides are the predominant treatment method used. As discussed previously, the limited monitoring studies performed on the S-CNF (Rose 2002) indicate that current weed treatment activities have not adversely impacted aquatic resources on the S-CNF. Therefore, it is unlikely that the combination of mechanical, biological, and chemical treatments and restoration (where appropriate) on 1,300 acres of weeds each year would adversely affect aquatic resources on the S-CNF.

Site restoration activities (where appropriate) following weed treatment, such as seeding, transplanting, and fertilizing, would not adversely affect aquatic habitat or resources. Fertilizer application rates would follow Forest Service and manufacturer guidelines. Any runoff of fertilizers would not be expected to be great enough to enrich streams. Seeding and transplanting activities would involve only limited soil disturbance.

Approximately 13,600 acres of weed infestations on the S-CNF would be treated under the Proposed Action each year using a combination, or one or the other, of aerial and ground-based herbicide applications. As noted above, herbicides also would be used in combination with mechanical, biological, and controlled grazing treatments to treat an additional 1,400 acres of noxious weeds on the S-CNF each year.

Aerial herbicide application would be the most effective and aggressive treatment method for quickly accessing and treating large weed-infested areas. Treated areas would then be reclaimed and restored, where appropriate. As an example, aquatic habitat conditions and resources, particularly those in the North Fork Ranger District where weed infestations (primarily spotted knapweed) are comparatively extensive, would be expected to benefit most from weed management by reducing the potential for soil erosion and sediment delivery to streams. Protected and sensitive aquatic species with narrow habitat requirements that were discussed previously would especially benefit from improved habitat conditions.

Numerous Forest Service NEPA documents prepared for weed management programs on other National Forests in the Intermountain West have examined the potential for adverse effects from the inadvertent introduction of herbicides into aquatic ecosystems. Findings presented in those documents that are applicable to the S-CNF are referenced in this Final EIS. On the S-CNF, spotted knapweed is by far the predominant noxious weed species, comprising approximately 96 percent of the total weed infestations. Five herbicides are identified in Appendix C of this Final EIS that can be used to treat spotted knapweed. They include 2,4-D amine, clopyralid, dicamba, glyphosate, and picloram. Herbicides besides these also could potentially be used to treat spotted knapweed as well as smaller infestations of other weed species. However, the range of toxicities of the five herbicides listed above provides a broad representation of possible adverse effects if herbicides inadvertently enter aquatic ecosystems. One of these herbicides—picloram—represents potentially worst-case conditions for aquatic organisms because of its relatively high toxicity and persistence and mobility in the environment compared to other herbicides. Appendix J lists various characteristics of these five herbicides as well as the other herbicides discussed in *Section 2.C.1.d, Chemical Treatment,* in *Chapter 2, Alternatives*.

The following examples illustrate the effectiveness of mitigation measures and BMPs, including buffer zones, in the aerial and ground-based application of herbicides to safely and effectively treat noxious weeds in the western United States. For the Mormon Ridge Winter Range Restoration Project on the Lolo National Forest in western Montana, picloram (Tordon 22K) was applied aerially in 1997 to treat noxious weeds on approximately 900 acres (TechLine 1998). This site provides important winter range for elk and deer because of the presence of large bunchgrass, but it had deteriorated due to spotted knapweed and leafy spurge infestations. Picloram was applied aerially at a rate of 1.5 pints per acre (approximately 0.37 pound per acre) using the same types of mitigation measures and BMPs that would be employed in aerial herbicide applications on the S-CNF, including a 300-foot no-treatment buffer to keep herbicides out of all fish-bearing water bodies. (S-CNF mitigation measures and BMPs are described in this Final EIS in *Section 2.D.3 Management Practices and Mitigation Measures,* Appendix A - USDA Forest Service Region 4 Best Management Practices for Weed Prevention and Management, and Appendix E - Aerial Spray Recommendations and Spray Dispersion Model Predictions). Water samples were collected from Mormon Creek prior to, during, 30 minutes after, and 60 minutes after aerial herbicide application (TechLine 1998). Water samples were tested for picloram at a detection level down to 0.01 part per billion (0.01 microgram per liter), which is far below any levels of toxicological significance (see Table 4-1). Picloram was not detected in any of the water samples, indicating the stream protection measures were effective. One year following treatment of the Morman Ridge site, weed production had declined 98 percent from 1,075 pounds per acre to 25 pounds per acre, while grass production had increased 714 percent from 350 pounds per acre to 2,850 pounds per acre (TechLine 1998).

Results of water monitoring studies in association with herbicide applications on the Angeles, Eldorado, Lassen, Sierra, and Stanislaus National Forests in Region 5 of the Forest Service also illustrate the effectiveness of BMPs and buffers when properly implemented (Bakke 2001). Over 140 surface water samples were collected on these Forests during reforestation and noxious weed eradication projects using ground-based applications of glyphosate and triclopyr. Both of these herbicides are proposed for use on the S-CNF. There were no detections of glyphosate in any samples taken after reforestation projects that were not ascribed to contamination. The one project with a detection of glyphosate involved treatment of noxious weeds within the riparian zone. Even here, only one of twelve samples had a detection of glyphosate and that was at a low level of 15 micrograms per liter, which is below any level of concern for human health or aquatic resources (Bakke 2001) (also see Table 4-1). The few positive detections of triclopyr in non-accidental or erroneous applications in water monitoring were all at low levels (highest 2.4 micrograms per liter). These levels are below any aquatic levels of concern. The highest level of triclopyr detected (82 micrograms per liter) was the result of an absence of an untreated buffer on an ephemeral stream, and even this level does not represent a substantial risk of harm to humans or the environment (Bakke 2001).

Herbicides proposed for use on the S-CNF also contain "inert" ingredients, including surfactants, that are not expected to have any significant effect. The dyes and other adjuvants described in *Chapter 2, Alternatives* are described as having little effect on wildlife populations. Mitigation measures, buffer zones BMPs, and SOPs are expected to minimize adverse impacts, if any, of these other ingredients.

There are reports that many synthetic chemicals released into the environment may disrupt normal endocrine function in a variety of aquatic life and wildlife. Some of the effects observed in animals have been attributed to some persistent organic chemicals such as polychlorinated biphenyls, DDT (dichlorodiphenyltrichloroethane), dioxin, and some pesticides. Adverse effects include abnormal thyroid function and development in fish and birds; decreased fertility in shellfish, fish, birds, and mammals; decreased hatching success in fish, birds, and reptiles; demasculinization and feminization of fish, birds, reptiles, and mammals; defeminization and masculinization of gastropods, fish, and birds; decreased offspring survival; and alteration of immune and behavioral function in birds and mammals. Some argue that these adverse effects may be due to an endocrine disrupting mechanism (EPA 1997). However, the causal link between exposure and endocrine disruption in wildlife is unclear (WHO 2002).

It is unknown whether herbicides have the same effect as DDT and other pesticide compounds. For example, 2,4-D mimics the growth hormone auxin, which in turn causes uncontrolled growth and eventually death in target plant species (Tu et al. 2001). This potential hormone disruption implicates 2,4-D as an endocrine disrupter. A recent study showed that 2,4-D does not influence male-to-female sex reversal in alligators (Guillette et al. 2000). However, little connection has been made between endocrine disruption in other wildlife or human health and herbicide use, primarily because information is not available (Safe et al., 2000). In addition, many other factors disturb wildlife growth, reproduction, and survival. Wildlife can be subject to a number of different stressors (such as habitat loss, competition, food availability, and disease) that may affect the same endocrine markers used to evaluate the effect of endocrine disrupters (Safe et al. 2002; WHO 2002). Thus, the relationship between adverse hormonal effects in wildlife and endocrine disruption remains speculative (WHO 2002).

Herbicides can inadvertently enter aquatic ecosystems through surface runoff, leaching through soils, accidental spills, and wind drift. The potential impact of a herbicide on aquatic organisms depends on the toxicity characteristics and exposure concentration of that herbicide. Table 4-1 presents toxicity levels to aquatic organisms of the five representative herbicides listed above that can be used to treat spotted knapweed. Toxicity levels are presented for four different categories. The 96-hour LC50 level is that concentration of herbicide that is lethal to 50 percent of the test organisms (primarily rainbow trout in the examples) exposed to that concentration for 96 hours. The lower the LC50 value, the more toxic the herbicide. While the 96-hour LC50 value provides a standard for comparing toxicities among herbicides, it is generally considered an unacceptable level of impact or risk to fish populations. Table 4-1 shows no-observed-effect levels (NOELs) or levels that are safe for aquatic organisms (dicamba is the exception in Table 4-1 because no long-term NOEL data on aquatic resources are available for this chemical.

Two other sets of values or criteria are listed in Table 4-1 that are believed by researchers to protect aquatic organisms.

TABLE 4-1
Toxic Levels of Herbicides to Fish (Concentrations in Milligrams per Liter)

Herbicide (test species)	96-hour LC50	LC50 Divided by 10	MATC[1]	NOEL
Picloram[2] (cutthroat trout)	3.5	0.35	0.12	0.29
2,4-D amine (aquatic)[3] (rainbow trout)	420	42	4	10
Glyphosate (aquatic)[4] (rainbow trout)	140	14	0.4	1
Dicamba[5] (rainbow trout)	28	2.8	1.12	No long-term data available
Clopyralid[6] (rainbow trout)	103	10.3	44	23

[1]MATC values from Mayer and Ellersieck (1986).
[2]96-hr LC50 and NOEL values from Woodward (1976, 1979).
[3]96-hr LC50 value from Mayer and Ellersieck (1986) and NOEL value from Syracuse Environmental Research Associates, Inc. (2001).
[4]96-hr LC50 and NOEL values from Syracuse Environmental Research Associates, Inc. (1996).
[5]96-hr LC50 value from Mayer and Ellersieck (1986).
[6]96-hr LC50 and NOEL values from Syracuse Environmental Research Associates, Inc. (1999).

In the first set of criteria, the EPA (EPA 1986) recommends that the 96-hour LC50 value be divided by 10 to set a standard for herbicide concentrations that will protect aquatic organisms (U.S. Forest Service 1999a; 2001d). In the second set of criteria developed by the USFWS (Mayer and Ellersieck 1986), the maximum acceptable toxicant concentration (MATC) represents the acute toxicity value of either rainbow trout or *Daphnia* spp. (a type of water flea), whichever is less, to a specific herbicide divided by 25. The USFWS believes that if herbicide concentrations are equal to or less than the MATC, then all aquatic species will be reasonably protected; certain individuals may still react to the herbicide but the overall population is considered safe (Mayer and Ellersieck 1986). The MATC value is generally lower than the LC50 divided by 10 value. The MATC method is comparable to methods used in risk assessments conducted by the Forest Service and complies with directions outlined in the Forest Service (1995) Handbook.

The LC50 divided by 10 values and the MATC values listed in Table 4-1 are used as criteria in the following assessment to determine the potential for herbicide-related impacts on aquatic organisms on the S-CNF. Both methods have been used in recent NEPA weed management assessment documents prepared by the Forest Service. The LC50 divided by 10 criteria were used for the FCRONRW in central Idaho (U.S. Forest Service 1999a) and the Sandpoint Ranger District in northern Idaho (U.S. Forest Service 2001d). The MATC criteria were used for the Beaverhead-Deerlodge National Forest (U.S. Forest Service 2001a) and the Flathead National Forest (U.S. Forest Service 2000a) in western Montana. Projected values are also compared against NOEL values in the following assessment. NOEL values usually exceed calculated MATC values (see Table 4-1). Appendix J contains detailed information on the characteristics, application rates, and toxicity of all of the herbicides proposed for use on the S-CNF.

To estimate the risk of possible herbicide concentration in streams, it is important to distinguish whether rainfall on a weed treatment site is infiltration-dominated or runoff-dominated. Rainfall typically percolates into the soil on an infiltration-dominated site, but it is more likely to produce overland flow on a runoff-dominated site. Vegetative cover, soil type, degree of surface disturbance and compaction, and land slope determine whether rainfall infiltrates or runs off a site (U.S. Forest Service 2001d, a, c; 1999a). Undisturbed forests and grasslands on the S-CNF are typically associated with infiltration-dominated sites. The overland transport of herbicides applied to smaller weed infestations occurring on this type of landscape would be expected to be minimal. However, many of the weed infestations on the S-CNF are associated with roads, trails, paths, and other areas where the soil has been disturbed and/or compacted. Road prisms, road cuts, and road fills are runoff-dominated features. They enhance runoff by concentrating flows on compacted road surfaces and in ditches, and in some cases by intercepting groundwater flow from cut slopes (Forest Service 2001d, a, c). Compacted, coarse-sized material with low organic matter that is used to create road fill slopes can also contribute to increased runoff. In addition, the Forest Service (1999a; 2001d, a, c) noted that, in general, weed-infested areas could increase overland runoff, citing studies by Lacey et al. (1989) who reported a 50 percent increase in runoff at a knapweed-infested site compared to a non-infested site. In these settings on the S-CNF, the potential for the inadvertent introduction of herbicides to streams would be expected to occur primarily via surface runoff.

Worst-Case Situations: Four worst-case situations involving the use of herbicides on the S-CNF are analyzed in the following text. They include the inadvertent entry of herbicides into aquatic ecosystems through surface runoff (six worst-case scenarios are examined), leaching through soils, accidental spills, and wind drift. These four situations are generally regarded as worst-case examples because of the extensive list of BMPs and mitigation measures described in *Chapter 2, Alternatives* that would be implemented as integral parts of the Proposed Action to avoid or minimize the potential for worst-case adverse effects to occur. For example, BMPs and mitigation measures are included to avoid or minimize the possibility of extreme rain events occurring after herbicide spraying, since such an occurrence could cause a runoff event. In addition, use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy described in *Chapter 2, Alternatives* would not result in worst-case conditions. These site-specific processes are designed to avoid or minimize the potential for adversely affecting S-CNF resources, especially sensitive resources.

Surface Runoff Following Application: Six worst-case scenarios involving surface runoff and the inadvertent entry of herbicides used to treat noxious weeds into drainages are analyzed in the following text. Two of these analyses assume that herbicides are used to treat spotted knapweed in the North Fork HUC 5 of the North Fork Ranger District. The first analysis examines the ground-based application of picloram and the second analysis examines the aerial application of 2,4-D amine. Inventoried infestations of spotted knapweed in this HUC 5 total approximately 24,300 acres and are by far the worst of any weed infestations present in HUC 5s on the S-CNF. The third worst-case scenario analyzed here examines the ground-based application of 2,4-D amine to treat spotted knapweed and Canada thistle in the Lost River Ranger District in the southern portion of the S-CNF. The final three worst-case scenarios are presented under the heading **Low Flow Watersheds.** These analyses examine the effects of herbicide treatment on three comparatively small

drainages associated with 6th order HUCs in the North Fork Ranger District (Hull Creek), Challis Ranger District (Eddy Creek), and Leadore Ranger District (Little Eightmile Creek). Appendix B provides details on the acres and species of weed infestations by Ranger District and HUC 5 on the S-CNF.

Picloram—North Fork Ranger District/North Fork HUC 5: This worst-case analysis involves the ground-based application of picloram to treat 50 acres of spotted knapweed in 1 day during summer. Picloram was selected for analysis because of its relatively high toxicity compared to other herbicides (see Table 4-1), and because of its persistence and mobility in the environment (see Appendix J). The ground-based herbicide treatment of 50 acres in a single day rather than over 1 week is regarded as an aggressive rate of weed treatment. Quartzite is the predominant soil type in the North Fork HUC 5 (see Appendix I) and is one of the more permeable soil types.

The Forest Service (1999a) cited field studies of pesticide spray operations that showed pesticide input to streams varied from non-detectable levels to 6 percent of the amount applied. The Forest Service (2001d) also cited reviews by Rice (1990), which showed that a maximum of 10 percent of picloram applied on a runoff-dominated site could potentially enter a stream in a 6-hour period in the event of rain. By comparison, only 1 percent of picloram applied on an infiltration-dominated site could potentially enter a stream via surface runoff in a 6-hour period in the event of rain. The Forest Service (2001a) reported that with picloram, the risk for contamination is generally greatest with the first storm following herbicide application that results in overland flows. The Forest Service (2001a) also reported that herbicide concentrations in streams generally peak in a 4- to 6-hour period following a runoff-generating event.

At an application rate of 0.50 pound per acre, a total of 25 pounds of picloram would be applied to the 50-acre treatment site. Assuming as a worst case that 10 percent of the applied picloram inadvertently runs off into a nearby drainage over a 6-hour period, that drainage would receive 2.5 pounds of picloram. The major drainage in the North Fork HUC 5 is the North Fork Salmon River. Average monthly flows during late summer/fall when the herbicide could potentially enter the North Fork because of a rainstorm vary from 19 cubic feet per second (cfs) in August to 14 cfs in October (U.S. Forest Service 1998). If 2.5 pounds of picloram enter the North Fork Salmon River over a 6-hour period in October, the resultant concentration would be 0.13 milligram of picloram per liter of river water (0.13 mg/L). This value is less than both the LC50 divided by 10 value (0.35 mg/L) and the NOEL value (0.29 mg/L) for picloram listed in Table 4-1 and essentially the same as the MATC value (0.12 mg/L). In the event of such a worst-case occurrence involving picloram, populations of aquatic life in the North Fork Salmon River, which include the threatened Snake River steelhead, Snake River spring/summer chinook salmon, and bull trout and the sensitive westslope cutthroat trout, would be considered safe according to definitions for these protective criteria. Resultant concentrations in tributaries to the North Fork Salmon River or any other drainage on the S-CNF that receives this same amount of picloram from a runoff-dominated site over a 6-hour period would not exceed the NOEL (0.29 mg/L) level if flows are at least 7 cfs.

Using these same assumptions and an application rate of 1 (rather than 0.50) pound of picloram per acre on a 50-acre runoff-dominated site, the resultant average concentration of picloram in the North Fork Salmon River in October during a 6-hour rainfall event would be

approximately 0.26 mg/L. This value is slightly less than both the LC50 divided by 10 value and the NOEL value, but exceeds the MATC value for picloram (see Table 4-1).

On infiltration-dominated sites where no more than 1 percent of the picloram applied could potentially enter a stream via surface runoff, the resultant average concentration in the North Fork Salmon River would be one-tenth what it would be for drainages receiving input from runoff-dominated sites. For the examples given above over a 50-acre treatment area, the resultant average concentration of picloram in the North Fork Salmon River in October would be 0.013 mg/L when applied at a rate of 0.5 pound per acre and 0.026 when applied at a rate of 1 pound per acre at an infiltration-dominated site. Both of these concentrations would be considerably less than the LC50 divided by 10, the NOEL, and the MATC values for picloram listed in Table 4-1. No adverse effects on populations of aquatic resources would be expected under these conditions.

The predominant soil type in the North Fork HUC 5 is quartzite (88 percent of the total), followed by granitic (5 percent), volcanic (4 percent), and valley bottom (3 percent) soil types (see Appendix I for detailed information on S-CNF HUC 5 soil types). As previously described in discussions of soil characteristics (see *Chapter 3, Section 3.D.3.a, Soils*), quartzite soils are one of the more permeable soil types and would typically be associated with an infiltration-dominated site. The previous worst-case analysis describing picloram concentrations associated with infiltration-dominated sites would therefore seem most applicable to the North Fork HUC 5. However, other site-specific characteristics such as slope, the type and abundance of vegetative cover, and degree of soil compaction also determine whether a treatment site is infiltration-dominated or runoff-dominated. This illustrátes the importance of using the site-specific implementation process, decision tree, minimum tool approach, and an adaptive strategy that were described in *Chapter 2, Alternatives* for the Proposed Action when selecting the most appropriate treatment option for a particular weed infestation site to minimize the potential for adverse effects.

2,4-D amine—North Fork Ranger District/North Fork HUC 5: This worst-case analysis involves the aerial application of 2,4-D amine to treat 500 acres of spotted knapweed in 1 day during summer. This analysis is believed to represent a worst-case scenario because of the very large acreage that would be treated in a single day, together with the assumption that a maximum of 10 percent of the applied herbicide on a runoff-dominated site would enter a stream via surface runoff over a 6-hour period. At an application rate of 1 pound of 2,4-D amine per acre, a total of 500 pounds of 2,4-D amine would be applied to the 500-acre treatment site in 1 day. This analysis assumes that 10 percent (50 pounds) of the applied 2,4-D amine runs off and enters the North Fork Salmon River over a 6-hour period in October when the average flow of the North Fork is 14 cfs (U.S. Forest Service 1998a). The resultant average concentration of 2,4-D amine in the North Fork would be 2.7 mg/L. This value is less than the LC50 divided by 10 value (42 mg/L), the MATC value (4 mg/L), and the NOEL value (10 mg/L) for 2,4-D amine, and populations of aquatic resources would be considered safe in the event such a worst-case scenario occurred. Resultant concentrations in tributaries to the North Fork Salmon River or any other drainage on the S-CNF that receives this same amount of 2,4-D amine from a runoff-dominated site over a 6-hour period would not exceed the MATC value if flows are at least 10 cfs.

Using these same assumptions and an application rate of 2 pounds (rather than 1 pound) of 2,4-D amine per acre on runoff-dominated sites, the resultant average concentration of

2,4-D amine in the North Fork Salmon River in October during a 6-hour rainfall event would be approximately 5.3 mg/L. This value is about eight times less than the LC50 divided by 10 value, and about half the NOEL value, but slightly exceeds the MATC value for aquatic life protection (see Table 4-1).

On infiltration-dominated sites where no more than 1 percent of the 2,4-D amine applied could potentially enter a stream via surface runoff, the resultant average concentration in the North Fork Salmon River in October would be approximately one-tenth what it would be if herbicide input was from runoff-dominated sites. Resultant concentrations of 2,4-D amine on infiltration-dominated sites would be 0.27 mg/L when applied at a rate of 1 pound per acre and 0.53 mg/L when applied at a rate of 2 pounds per acre. These values should not represent a risk to aquatic resources based on values listed in Table 4-1. As noted previously, the more permeable quartzite soil type is predominant in this HUC 5.

An additional worst-case scenario involving the potential cumulative effects of 2,4-D amine on the mainstem Salmon River was analyzed. This analysis assumes that 15,000 acres of spotted knapweed in the northern portion of the S-CNF would be treated with herbicide under the Proposed Action in 1 day during summer using 2,4-D amine at an application rate of 1 pound per acre. It is further assumed that 10 percent of the applied 2,4-D amine inadvertently enters the mainstem Salmon River over a 6-hour period because of a rainfall event. Flows in the mainstem Salmon River at Salmon (U.S. Geological Survey gage site 1330250) average 1,236 cfs in August and 1,085 cfs in September. The resultant average concentration of 2,4-D amine in the mainstem Salmon River at a flow of 1,085 cfs would be 1.03 mg/L. This value is about four times less than the MATC value and 10 times less than the NOEL value for 2,4-D amine (see Table 4-1) and would not be expected to adversely affect populations of aquatic resources in the mainstem Salmon River. The MATC value for 2,4-D amine would not be exceeded under these conditions so long as river flow is approximately 280 cfs or greater.

2,4-D amine—Lost River Ranger District/Upper Little Lost HUC 5: This worst-case analysis involves the ground-based application of 2,4-D amine to treat 58 acres of Canada thistle and spotted knapweed in 1 day during summer. These weed infestations are located in the Lost River Ranger District in the Upper Little Lost HUC 5 of the Little Lost HUC 4. The herbicide 2,4-D amine can be used to treat both of these weed species (see Appendix C). This analysis is believed to represent a worst-case scenario, but for the southern portion of the S-CNF rather than the northern portion as in the previous two worst-case scenarios. It assumes that a relatively large acreage of weeds (at least for this portion of the S-CNF) would be treated in a single day within a single HUC 5, and that a maximum of 10 percent of the applied herbicide on a runoff-dominated site would enter a stream via surface runoff over a 6-hour period. At an application rate of 1 pound of 2,4-D amine per acre, a total of 58 pounds of 2,4-D amine would be applied to the 58-acre treatment site in 1 day. This analysis assumes that 10 percent (5.8 pounds) of the applied 2,4-D amine runs off during a rainfall event and enters a headwater tributary to the upper Little Lost River over a 6-hour period. It also is assumed that this event occurs in October during a typical low-flow period when the average tributary flow is only 2 cfs. The resultant average concentration of 2,4-D amine in the headwater tributary would be 2.2 mg/L. This value would be less than the LC50 divided by 10 value (42 mg/L), the MATC value (4 mg/L), and the NOEL value

(10 mg/L) for 2,4-D amine (see Table 4-1), and populations of aquatic resources would be considered safe in the event such a worst-case situation occurred.

On infiltration-dominated sites where no more than 1 percent of the 2,4-D amine could potentially enter a stream via surface runoff, the resultant average concentration of 2,4-D amine in the headwater tributary flowing at 2 cfs would be 0.22 mg/L, or one-tenth what it would be if herbicide input was from a runoff-dominated site. This analysis indicates that for both runoff- and infiltration-dominated sites on the southern S-CNF and in other portions of the S-CNF where weed infestations (and potential herbicide uses) are far less extensive than in the northern S-CNF, populations of aquatic life in the upper Little Lost River drainage would be considered safe according to protective criteria in Table 4-1. These populations include the threatened bull trout.

Soil types in the Upper Little Lost HUC 5 reflect a mixed geology, with sedimentary soils most abundant (45 percent of the total) and lesser amounts of volcanic (29 percent) and quartzite (26 percent) soils present (see Appendix I for details on soil types). As described in *Chapter 3, Section 3.D.3.a, Soils*, sedimentary and volcanic soils generally tend to be less permeable than quartzite soils. This suggests, based on predominant soil characteristics, that weed treatment areas in the Upper Little Lost HUC 5 would tend to be runoff-dominated sites. This and other factors (for example, slope and type and amount of vegetative cover) affecting whether a site is runoff- or infiltration-dominated would be determined as part of the site-specific implementation process in selecting the treatment option that will not cause adverse environmental effects.

Low Flow Watersheds

North Fork Ranger District, North Fork HUC 5, Hull Creek (HUC 170602030502): Hull Creek has a flow of 0.72 cfs and drains 8,419 acres. Spotted knapweed is by far the dominant weed species and is much more abundant in this area of the S-CNF than in other areas. Quartzite soils, which are relatively permeable, are the predominant soil type in this area of the S-CNF. Using the same assumptions for runoff- and infiltration-dominated sites during a rainfall event as in the previous analyses, applying picloram at rates of 0.50 and 1 pound per acre to treat spotted knapweed, and given that flow in Hull Creek is 0.72 cfs, the maximum number of acres that could be treated in 1 day without exceeding the MATC value for picloram (0.12 mg/L, see Table 4-1), which is considered protective of aquatic life, was calculated. These calculations show that on a runoff-dominated site in the Hull Creek watershed, the maximum number of acres that could be treated in 1 day with picloram at application rates of 0.50 and 1 pound per acre without exceeding the MATC value would be approximately 2 acres and 1 acre, respectively. On an infiltration-dominated site, the maximum number of acres that could be treated in 1 day with picloram at application rates of 0.50 and 1 pound per acre without exceeding the MATC value would be approximately 20 acres and 10 acres, respectively.

As an additional analysis, the maximum number of acres of spotted knapweed in the Hull Creek watershed that could be treated in 1 day using 2,4-D amine rather than picloram without exceeding the MATC value for 2,4-D (4 mg/L, see Table 4-1) also was calculated. Application rates of 1 and 2 pounds of 2,4-D per acre were assessed. These calculations show that on a runoff-dominated site, the maximum number of acres that could be treated in 1 day with 2,4-D amine at application rates of 1 and 2 pounds per acre without exceeding

the MATC value, which is considered protective of aquatic life, would be approximately 38 acres and 19 acres, respectively. On an infiltration-dominated site, the maximum number of acres that could be treated in 1 day with 2,4-D amine at application rates of 1 and 2 pounds per acre without exceeding the MATC value would be approximately 380 acres and 190 acres, respectively.

Challis Ranger District, Challis Creek HUC 5, Eddy Creek (HUC 170602010206): Eddy Creek has a flow of 2.51cfs and drains 13,492 acres. A total of 132 acres of spotted knapweed, 5 acres of musk thistle, and 5 acres of leafy spurge have been inventoried in the Challis Creek HUC 5 that contains the Eddy Creek watershed. Volcanic soils, which are among the less permeable soils on the S-CNF, comprise 90 percent of the soil types in the Challis Creek HUC 5. The same type of analysis of picloram and 2,4-D amine as described above for Hull Creek was conducted for Eddy Creek, but using a creek flow of 2.51 cfs. Calculations for picloram show that on a runoff-dominated site in the Eddy Creek watershed, the maximum number of acres that could be treated in 1 day with picloram at application rates of 0.50 and 1 pound per acre without exceeding the MATC value of 0.12 mg/L would be approximately 8 acres and 4 acres, respectively. On an infiltration-dominated site, the maximum number of acres that could be treated in 1 day with picloram at application rates of 0.50 and 1 pound per acre without exceeding the MATC value would be approximately 80 acres and 40 acres, respectively.

Calculations for 2,4-D amine show that on a runoff-dominated site, the maximum number of acres that could be treated in 1 day with 2,4-D amine at application rates of 1 and 2 pounds per acre without exceeding the MATC value of 4 mg/L would be approximately 135 acres and 67 acres, respectively. On an infiltration-dominated site in the Eddy Creek watershed, the maximum number of acres that could be treated in 1 day with 2,4-D amine at application rates of 1 and 2 pounds per acre without exceeding the MATC value would be approximately 1,350 acres and 670 acres, respectively. These data suggest that, if desired and depending on site characteristics determined during the site-specific implementation process, a combination of picloram and 2,4-D amine could be applied at appropriate rates in a single day to treat all of the inventoried weed infestations in the Challis Creek HUC 5 without adversely impacting aquatic resources. Appendix H shows that the threatened bull trout and Snake River spring/summer chinook salmon and the sensitive westslope cutthroat trout occur in the Challis Creek HUC 5.

Leadore Ranger District, Middle Lemhi HUC 5, Little Eightmile Creek (HUC 170602040306): Little Eightmile Creek has a flow of 1.13 cfs and drains 12,534 acres. A total of 197 acres of spotted knapweed, 53 acres of musk thistle, 37 acres of Canada thistle, and 3 acres of leafy spurge have been inventoried in the Middle Lemhi HUC 5 that contains the Little Eightmile Creek watershed. Quartzite is the predominant soil type (63 percent of the total) in the Middle Lemhi HUC 5, followed by lesser amounts of the less permeable volcanic (15 percent) and sedimentary (11 percent) soil types. The same type of analysis of picloram and 2,4-D amine as described above for Hull Creek and Eddy Creek was conducted for Little Eightmile Creek, but using a creek flow of 1.13 cfs. Calculations for picloram show that on a runoff-dominated site in the Little Eightmile Creek watershed, the maximum number of acres that could be treated in 1 day at application rates of 0.50 and 1 pound per acre without exceeding the MATC value of 0.12 mg/L would be approximately 4 acres and 2 acres, respectively. On an infiltration-dominated site, the maximum number of

acres that could be treated in 1 day with picloram at application rates of 0.50 and 1 pound per acre without exceeding the MATC value would be approximately 40 acres and 20 acres, respectively.

Calculations for 2,4-D amine show that on a runoff-dominated site, the maximum number of acres that could be treated in 1 day at application rates of 1 and 2 pounds per acre without exceeding the MATC value of 4 mg/L would be approximately 60 acres and 30 acres, respectively. On an infiltration-dominated site in the Little Eightmile Creek watershed, the maximum number of acres that could be treated in 1 day with 2,4-D amine at application rates of 1 and 2 pounds per acre without exceeding the MATC value would be approximately 600 acres and 300 acres, respectively. These data suggest that if desired, and depending on site-specific characteristics determined during the implementation process, a combination of picloram and 2,4-D amine could be applied at appropriate rates in a single day to treat all or most of the 290 acres of inventoried weed infestations in the Middle Lemhi HUC 5 without adversely impacting aquatic resources. Appendix H shows that the threatened bull trout and Snake River spring/summer chinook salmon and the sensitive westslope cutthroat trout occur in the Middle Lemhi HUC 5.

Leaching

Herbicides can potentially move through soils with rainfall, depending on soil permeability and water-holding capacity. They can subsequently enter groundwater and surface water and potentially adversely affect aquatic resources if their concentrations are high enough. If a soil is coarse and permeable, water can pass through the soil rapidly and carry some of the herbicide with it. If soils retain water in their upper horizons for later use by plants, there will be less opportunity for the water and herbicide to move through the soil and impact aquatic resources (U.S. Forest Service 1999a). The Forest Service (U.S. Forest Service 2001a) noted that a reduced potential for leaching is largely facilitated by plant uptake of the herbicide, natural decomposition, and volatization of active ingredients in the herbicide, and adsorption of the herbicide by soil particles. In their review of forest chemicals, Norris et al. (1991) stated that the "leaching of chemicals through the soil profile is a process of major public concern, but it is the least likely to occur in forest environments." Norris et al. 1991 noted that most chemicals are relatively immobile in soil and that intense leaching can move chemicals a few centimeters to 1 meter in depth, but these distances are short in comparison to distances between treated areas and streams.

The Forest Service (U.S. Forest Service 1999a) cited studies by Watson et al. (1989) on the occurrence of picloram in coarse soils in western Montana following its application at a rate of 1 pound per acre. As noted previously, picloram is a relatively mobile, persistent, and toxic herbicide that can be used to treat spotted knapweed. Picloram concentrations in the upper 5 inches of soil in the western Montana studies ranged from 205 to 366 parts per billion (ppb); the maximum concentration measured at soil depths between 30 and 40 inches was 24 ppb. No picloram was measured in shallow groundwater wells (detection level = 0.5 ppb) (U.S. Forest Service 1999a). A detection level of 0.5 ppb is equivalent to a concentration of 0.0005 mg/L, which is approximately 240 times less than the MATC value for picloram (see Table 4-1) believed by the FWS to be safe for populations of aquatic resources.

The Forest Service (1999a) cited other studies that measured and compared soil concentrations of herbicides less persistent in the environment than picloram. Specific data on soil permeability characteristics were not cited by the Forest Service (1999a). In those studies, Rice et al. (1992) found that clopyralid was never detected at soil depths greater than 10 inches, and after 30 days 2,4-D was never detected at soil depths greater than 2 inches. In those same studies, picloram was detected at soil depths between 10 and 20 inches within 30 days following spraying, but it was not detected (detection level = 10 ppb or 0.01 mg/L) at a soil depth greater than 10 inches 1 or 2 years after spraying (Rice et al. 1992). The Forest Service (1999a) concluded that there is relatively little risk of the deep leaching of picloram, clopyralid, or 2,4-D; they assumed results would be similar for the herbicide dicamba, even though it was not tested, because its persistence and mobility are similar to those of 2,4-D and clopyralid. The Forest Service cited other studies showing there is little probability of carryover of 2,4-D or dicamba in soils from one summer to the following spring because of their short half-lives, and thus limited opportunity for these herbicides to accumulate in the soil and migrate into groundwater. The Forest Service (1999a) stated that even if small amounts of any of these herbicides entered streams or larger rivers on the FCRONRW that the "dilution factor would render the herbicide concentrations to infinitesimal levels."

It is similarly expected that any concentrations of herbicides that may leach through soils and reach surface waters on the S-CNF would not pose a risk to aquatic resources. It is anticipated that picloram application rates on the S-CNF would not exceed approximately 1 pound per acre (the same as in the western Montana studies of coarse, permeable soils by Watson et al. [1989]), and would therefore not occur in soil concentrations great enough to subsequently adversely affect aquatic resources. As noted in the previous discussion on the surface runoff of herbicides, many of the weed infestation sites on the S-CNF—either because of the presence of weeds and their effects on runoff and/or the nature of constructed features weeds are often associated with—are likely runoff-dominated sites rather than infiltration-dominated sites. The likelihood of exposing, much less adversely affecting, aquatic resources to herbicides leached through soils would therefore be very low.

The previous discussion of surface runoff also notes that soil types vary across the S-CNF and can influence the degree to which a weed infestation site is runoff-dominated or infiltration-dominated. For example, soil types associated with locations assessed in the worst-case analyses indicate runoff-dominated conditions in the Upper Little Lost HUC 5 (Lost River Ranger District) and the Challis Creek HUC 5 (Challis Ranger District) and infiltration-dominated conditions in the Middle Lemhi HUC 5 (Leadore Ranger District) and the North Fork HUC 5 (North Fork Ranger District). *Section 3.D.3.a, Soils* in *Chapter 3* generally describes soils characteristics on the S-CNF and notes that on average, all soil types on the S-CNF have moderate amounts of coarse fragments. Appendix I provides information on the percentage abundance of different soil types in each HUC 5 within the S-CNF that can be used to infer soil permeability. Very generally, the most frequently occurring predominant soil types by Ranger District tend to consist of the following: Challis Ranger District (volcanic, sedimentary, and quartzite); Leadore Ranger District (quartzite); Lost River Ranger District (sedimentary); Middle Fork Ranger District (volcanic and quartzite); North Fork Ranger District (quartzite and granitic); Salmon-Cobalt Ranger District (volcanic, quartzite, and granitic); and Yankee Fork Ranger District (volcanic, quartzite, and sedimentary). The predominance of quartzite soils, which are among the

more permeable soil types, in the North Fork HUC 5 where the majority of noxious weeds that have been inventoried on the S-CNF occur illustrates the importance of considering site-specific characteristics before beginning weed treatments.

The site-specific implementation process, decision tree, and minimum tool approach described in *Chapter 2, Alternatives* for the Proposed Action (and Alternatives 1 and 2), together with the Herbicide Leaching Sensitivity Evaluation System presented in Appendix F, are designed to consider soil characteristics such as permeability and leaching potential prior to weed treatment at a particular site in order to avoid or minimize the potential for herbicides to move through soils and impact aquatic resources. In the case of herbicide application, an additional important step in this process is the consideration of different herbicide properties, such as their toxicity to terrestrial and aquatic organisms, persistence and half-life, mobility and sorption to soil particles, water solubility, and other characteristics. Appendix J lists and defines a range of information on herbicide properties and behavioral aspects that can be used to select the most appropriate treatment option given site-specific characteristics. As noted above, the objective of the site-specific process is to evaluate and select a treatment option that will avoid or minimize the potential for herbicides to adversely affect aquatic resources.

Accidental Spills

The Forest Service (U.S. Forest Service 2001a) reports that most groundwater contamination by herbicides derives from point source discharges, such as accidental spills, leaks, storage and handling facilities, improperly discarded containers, or rinsing equipment in loading and handling areas. These discharges can result in localized high concentrations of herbicides. The Forest Service (1999a) discussed results of two studies where picloram was intentionally introduced to streams. In the first study, 2.8 pounds of picloram were introduced to a stream flowing 190 cfs. (By comparison, the North Fork Salmon River averages 140 cfs in June.) Maximum picloram concentration 100 yards downstream from the introduction point 6 minutes later was 14 mg/L. About 3.5 miles downstream, the maximum picloram concentration was 0.005 mg/L, which is less than the MATC (0.12 mg/L) and NOEL (0.29 mg/L) values for picloram (see Table 4-1). In a second study, a picloram concentrate of 6.26 mg/L was metered into a stream for 50 minutes. No picloram was detected (detection level = 0.001 mg/L) beyond about 4 miles downstream. The maximum picloram concentration upstream of this point (2.362 ppm, measured about .25 mile downstream of the introduction point) lasted approximately 1 hour. Based on these studies, the Forest Service (1999a) observed that: 1) herbicide concentrations tend to drop rapidly within a short distance of the spill site, and 2) at any given point in the stream, the elapsed time of exposure to the spilled herbicide should be short.

If the above-referenced picloram concentrations were to occur on the S-CNF, they would be expected to cause at least some mortalities of aquatic resources in the first 3 to 4 miles of stream downstream from the spill. However, concentrations would quickly decline to less than the MATC and NOEL levels farther downstream, and should not adversely affect populations of aquatic resources. If a herbicide spill occurred on the S-CNF, the potential for adversely affecting aquatic resources or significantly jeopardizing a listed fish population would depend on numerous factors, including the spill amount, herbicide toxicity, exposure duration, and receiving water flow. To reduce the risk of this potential occurrence, a number of BMPs and mitigation measures were identified in *Chapter 2, Alternatives* for both the

ground-based and aerial application of herbicides. Examples include defined procedures for mixing, loading, and disposing of herbicides; only mixing herbicides at sites where spills into streams could not occur; properly calibrating, rinsing, and cleaning equipment; having an approved herbicide emergency spill plan and spill containment equipment available during herbicide application; maintaining various-sized, no-treatment/no-spray buffer zones around aquatic resources, depending on the nature of the resource and method of herbicide application; and many others.

Wind Drift

Aerial spraying near aquatic and riparian zones perhaps represents the greatest potential to expose aquatic organisms and amphibians to contaminants either through direct application or wind drift. Risk of contamination during the ground-based application of herbicides is less than during aerial application because application occurs more slowly and applicators are able to recognize potential problems and adjust their application techniques (U.S. Forest Service 2001a). To reduce the risk of the potential for such impacts to occur, a number of BMPs and mitigation measures were identified in *Chapter 2, Alternatives* for both the ground-based and aerial application of herbicides. These include obtaining a weather forecast prior to spraying to ensure no extreme weather events would occur during or soon after spraying that would allow drift or runoff into streams; not spraying when wind velocity exceeds fixed standards and is in a direction that could impact sensitive resources; maintaining various-sized, no-treatment/no-spray buffer zones around aquatic and riparian resources, depending on the nature of the resource and method of herbicide application; using appropriate air speed and aircraft height to reduce wind drift potential; using on-site wind-monitoring devices to determine wind direction and speed; and many others.

BMPs and mitigation measures described in the preceding text and in *Chapter 2, Alternatives* are designed to minimize or avoid the potential for impacts associated with wind drift and inadvertent spraying of aquatic and riparian resources. The BMPs and mitigation measures for the Proposed Action provide specific standards to ensure proper application of herbicides within riparian buffers—areas where amphibians typically occur. These BMPs and mitigation measures should minimize the potential for adverse effects on amphibians, as well as other riparian and aquatic resources. In addition, Appendix E contains aerial spray recommendations and spray dispersion model predictions that provide appropriate examples for possible application on the S-CNF.

Summary

The direct and indirect effects of weed treatment under the Proposed Action would be expected to result in improved habitat conditions and reduced threats for aquatic and riparian resources on the S-CNF. However, short term disturbances may occur and may have a slight negative effect on aquatic resources in specific areas. Weed infestations would progressively decline, reducing the potential for erosion and sediment delivery to drainages and benefiting aquatic resources, particularly in the northern part of the S-CNF. It is unlikely that any of the worst-case situations analyzed in the preceding text, including the northern S-CNF where some weed infestations are severe and the central and southern S-CNF where weed infestations are much less extensive, would occur because of the implementation of BMPs and mitigation measures, and use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy. If worst-case

conditions did occur, the scenarios involving herbicide runoff and leaching of herbicides would not be expected to result in adverse impacts on populations of aquatic resources, including fish, invertebrates, and amphibians. Potential short-term impacts on aquatic and riparian resources could occur if there was an accidental spill of a relatively toxic herbicide in a small drainage. Resultant effects may be localized depending on various factors, including the volume of spill and dilution by the receiving water. Adherence to BMPs and mitigation measures would reduce the likelihood of such a spill occurring, plus they would minimize or avoid the potential occurrence of wind-drift-related impacts on aquatic resources and amphibians. It is noted that the USFWS and NMFS have not prohibited the use of herbicides in weed treatments on the S-CNF in their ESA review of, and concurrence on, Biological Assessments prepared for weed management on the S-CNF.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on S-CNF resources. Numerous examples were presented previously in the discussions of worst-case situations. A total of 59 management practices and mitigation measures address weed prevention and management BMPs and the proper application of herbicides, including 22 measures specifically directed at the proper aerial application of herbicides. All of these measures are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Examples include compliance with all State and Federal laws and agency manuals, handbooks, and guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; use of a 50-foot no-spray buffer zone for broadcast or 'block' applications and use of a 15-foot buffer for spot applications along all flowing water streams and ponded water bodies (reduced buffer zones will be considered when using label-approved aquatic formulations [e.g., aquatic 2,4-D]); no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; no spraying of picloram within 100 feet of surface water when wind velocity exceeds 5 mph, and no more than one application of picloram in a treatment area in a year; use of label-approved aquatic formulations near open water; and BMPs and mitigation measures described in the preceding discussions in this section regarding accidental spills of herbicides and wind drift during aerial application. This includes a 300-foot no-treatment buffer zone on all fish-bearing streams, lakes, and ponds and a 100-foot no-treatment buffer zone on non-fish-bearing waters during aerial herbicide application. Also, aerial herbicide application will not occur during periods of inversion. In addition, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives*. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources.

Cumulative Effects. Cumulative effects from treatments under the Proposed Action combined with treatments under the three CWMAs would result in benefits to aquatic habitat and resources compared to the No Action Alternative through the widespread eradication, control, and containment of noxious weeds. The CWMAs and the S-CNF weed management program would cumulatively be expected to result in increased levels of weed treatment success. Under the Proposed Action, weed infestation on the S-CNF would progressively decline. This would reflect the eradication, control, and/or containment of

new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, and increased success in preventing weeds presently occurring on the S-CNF from invading adjacent lands. This particular benefit may directly contribute to a decline of weeds on adjacent non-National Forest land.

This cumulative effect could potentially benefit aquatic and riparian habitat and a range of protected and other sensitive management indicator species through reduced erosion and sediment delivery to drainages. Beneficial cumulative effects on aquatic resources may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations that would be aggressively managed. No adverse downstream cumulative effects on non-National Forest land would be expected from worst-case situations involving herbicide runoff or leaching because of the extremely low concentrations. There is the potential for downstream adverse effects on aquatic and riparian resources if a herbicide spill or wind-drift-related impact occurred close to Forest Service boundaries. Increased flows proceeding downstream would further dilute the herbicide. Weed management BMPs and mitigation measures described previously are designed to prevent or reduce the risk of these types of impacts from occurring.

Additional cumulative effects on aquatic resources associated with other ongoing activities on the S-CNF that were described for the No Action Alternative would also occur under the Proposed Action. These cumulative effects include the potential for erosion and sediment delivery from road and trail-related construction and maintenance activities, livestock grazing along drainages, and recreational activities adjacent to drainages. Also, cumulative effects on aquatic resources from weed treatment activities under the Proposed Action potentially include short-term increases in erosion and sediment delivery to drainages caused by more extensive mechanical treatments (soil disturbance) and chemical treatments (creation of barren ground from weed removal) than under the No Action Alternative. These areas would be subject to erosion until native vegetation becomes re-established, after which time erosion and sediment delivery should be less than when weeds were present and provide correspondingly greater benefits than under the No Action Alternative. This would represent an overall long-term cumulative benefit to aquatic habitat and resources. Finally, there is the possibility of herbicide application in adjacent areas (S-CNF and CWMA) and possible cumulative effects on aquatic resources. However, the CWMA efforts are coordinated with the management agencies to avoid multiple treatments within a defined geographic location. In addition, all such applications would be in accordance with EPA label guidelines, which are designed to protect aquatic organisms.

The Forest Service (2001d) discussed the potential for two additional types of cumulative effects on aquatic organisms in northern Idaho from herbicide application. These are the potential for the bioconcentration of herbicides in aquatic organisms and the possibility of synergistic, combined effects on aquatic organisms when several herbicides are present. For bioconcentration to occur, a pollutant must be present in a high concentration for an extended period of time, the organism must be exposed to the pollutant, and the pollutant must have a high resistance to breakdown or excretion by the organism to allow a sufficient uptake period that would result in an elevated bioconcentration. The Forest Service (2001a) concluded that the risk of bioconcentration would be low because of the relatively small amount and timing of herbicide application. The risk of herbicide bioconcentration in aquatic organisms on the S-CNF also would be expected to be low because of the extremely

low concentrations of herbicides that aquatic organisms would be briefly exposed to during even a worst-case situation. In addition, the herbicides listed in Table 4-1 that could be used to treat spotted knapweed on the S-CNF do not bioaccumulate in fish and/or have very little persistence in the environment (Information Ventures, Inc. 2002).

The Forest Service (2001a) concluded that no synergistic effects from herbicide application would occur. This was because: 1) the EPA currently supports an additive model in predicting synergistic effects, 2) relatively small amounts of herbicides would be applied, and 3) where more than one herbicide is applied the amount of each chemical applied would typically be reduced. This same rationale and conclusion regarding the potential for synergistic effects on aquatic resources also applies to the S-CNF. In addition, because the chances of multiple different herbicide activities taking place in the same drainage on the same day are unlikely, the potential for cumulative synergistic effects on aquatic organisms on the S-CNF would be minimal.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect effects on aquatic habitat and on fish, aquatic invertebrate, and amphibian species under Alternative 1 would generally be similar to those effects described for the Proposed Action, with one important difference. There would be no aerial application of herbicides under Alternative 1, making it a less aggressive weed treatment alternative than the Proposed Action. A combination of primarily biological and ground-based chemical methods rather than aerial herbicide application would be used to treat weed infestations on the S-CNF under Alternative 1. Some weed infestations would be more difficult to access and require more time to treat under Alternative 1 compared to aerial herbicide applications under the Proposed Action. The resulting benefits to aquatic resources resulting from reductions in erosion and sediment delivery from weed-infested areas would still be expected, but to a lesser degree and would take longer to achieve than under the Proposed Action. There would be long-term benefits to protected and sensitive fish species, such as the Snake River steelhead, spring/summer chinook salmon, and sockeye salmon, and to bull trout and westslope cutthroat trout—especially in the northern part of the S-CNF.

Several of the examples of worst-case situations described for the Proposed Action could not occur under Alternative 1 because of differences in treatment techniques. These worst-case situations include the scenario describing runoff of 2,4-D amine aerially applied on 500 acres in a single day, plus possible wind-drift-related impacts on aquatic resources and amphibians in riparian areas from the aerial application of herbicides. The other examples of worst-case situations presented for the Proposed Action regarding the surface runoff of picloram or 2,4-D amine in a single day, leaching of herbicides, and an accidental herbicide spill could potentially occur under Alternative 1. Resultant effects on aquatic resources would be the same as described for the Proposed Action, and would be expected to be negligible or short-term and localized. Also, as noted for the No Action Alternative, the limited monitoring studies performed on the S-CNF (Rose 2002) indicate that current weed treatment activities have not adversely impacted aquatic resources on the S-CNF.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 would be the same as for the Proposed Action except for measures dealing with the aerial application of herbicides. These measures are described in

detail in *Section 2.D.3, Management Practices and Mitigation Measures,* and a number of examples were listed in the discussion of BMPs and mitigation measures for the Proposed Action. Alternative 1, like the Proposed Action, also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives*. These management tools are used to select a site-specific treatment method that achieves weed management goals with the least impact to S-CNF resources present at or near the treatment site.

Cumulative Effects. The same general kinds of beneficial cumulative effects resulting from the successful treatment of noxious weeds on the S-CNF and under the three CWMAs that were described for the Proposed Action would occur under Alternative 1, but they would take longer to achieve and be somewhat less effective because of the absence of the aerial application of herbicides. These long-term effects include the expected decline in noxious weeds and resultant benefits to aquatic and riparian habitat and species on and possibly adjacent to the S-CNF. No adverse downstream cumulative effects on non-National Forest land would be expected from worst-case situations involving herbicide runoff or leaching because of the extremely low concentrations. There is the potential for downstream adverse effects on aquatic resources if a herbicide spill occurred close to Forest Service boundaries, although increased downstream flows would further dilute the herbicide. Weed management BMPs and mitigation measures are designed to prevent or reduce the risk of these types of impacts from occurring. The risks of herbicide bioconcentration and synergistic effects on aquatic organisms under Alternative 1 are expected to be minimal for the same reasons as described for the Proposed Action.

Adverse cumulative effects on aquatic resources associated with other ongoing activities on the S-CNF and from weed treatment activities that were described for the Proposed Action and No Action Alternative would also occur under Alternative 1. These cumulative effects include the potential for erosion and sediment delivery from road and trail-related construction and maintenance activities, livestock grazing along drainages, recreational activities adjacent to drainages, and short-term increases in erosion and sediment delivery to drainages caused by more extensive mechanical treatments (soil disturbance) and chemical treatments (creation of barren ground). Disturbed and barren areas would be subject to erosion until native vegetation becomes re-established, after which time erosion and sediment delivery should be less than when weeds were present and provide correspondingly greater benefits than under the No Action Alternative but less than under the Proposed Action. The possibility of simultaneous herbicide application in adjacent areas (S-CNF and CWMAs)is unlikely since the CWMA efforts are coordinated with the management agencies to avoid multiple treatments within a defined geographic location. In addition, all such applications would be in accordance with EPA label guidelines, which are designed to protect aquatic organisms.

d. Alternative 2

Direct and Indirect Effects. The magnitude of direct and indirect benefits to aquatic resources under Alternative 2 would be expected to be less than under the Proposed Action, Alternative 1, or the No Action Alternative. Weed treatment methods have been identified for all of the inventoried weed infestations on the S-CNF under Alternative 2, but they do not include the ground-based or aerial application of herbicides. Instead, mechanical and biological treatments or their combination would be by far the predominant methods used

to treat weeds on the S-CNF. Because fewer treatment methods are available for treating weeds under Alternative 2 and because it is only realistic to control or contain rather than reduce the size of weed infestations under Alternative 2, it would take longer to achieve lesser levels of weed treatment success than anticipated under the Proposed Action, Alternative 1, or the No Action Alternative. The effectiveness of mechanical and biological treatment options in the eradication, control, or containment of invasive weeds can be delayed from several months to several years while the establishment and expansion of weeds continues. As a result, it also would take longer to realize some benefits to aquatic and riparian resources resulting from reduced erosion and sediment delivery at weed-infested sites to drainages. Increased direct and indirect impacts on aquatic resources would likely occur due to the increase in soil disturbance resulting from mechanical treatment activities. This would be especially true on the northern part of the S-CNF where weed infestations are substantially greater than on any other area of the S-CNF. There would be no potential for any of the worst-case situations involving herbicide application described for the Proposed Action, Alternative 1, or the No Action Alternative to occur under Alternative 2.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Examples presented for the Proposed Action and other alternatives except those directed at the uses of herbicides, also apply to Alternative 2.

Cumulative Effects. The success of the coordinated CWMA programs would be severely hampered under Alternative 2. It would take longer to achieve a lesser level of success because of the absence of the application of herbicides. In some instances, these long-term results may include the expected gradual decline in noxious weeds and some resultant gradual benefits to aquatic and riparian habitat and to fish, aquatic invertebrates, and amphibians on and possibly adjacent to the S-CNF. Adverse cumulative effects under Alternative 2 would be greater than those described for the Proposed Action and other alternatives including sediment delivery from other ongoing S-CNF activities plus the creation of extensive disturbed and barren areas from the mechanical treatment of weeds. Under Alternative 2 there would be no potential for adverse cumulative effects on the S-CNF or adjacent non-National Forest lands from herbicide application, bioconcentration, or possible synergistic interactions, or from the creation of barren areas due to weed removal using herbicides.

4.B.3. Wildlife Resources

a. No Action Alternative

Direct and Indirect Effects. Although the No Action Alternative does not mean there would be no accomplishments or activities relative to weed control, continuing the existing weed management/control activities would not halt the spread of weeds on the S-CNF, particularly on the northern end. Even though there are weed control treatments in this alternative, weed populations would continue to expand, given the widespread nature of the weed populations compared to the acreage treated each year and their projected rate of

spread (see *Section 4.B.1, Vegetation Resources and Noxious Weeds,* for discussion of rate of weed spread).

Impacts from weed control activities on all wildlife species would include very short-term disturbance and displacement during treatment application, usually less than 1 day in duration. These disturbances are most likely to occur in sagebrush/grass plant communities, low-elevation ponderosa pine and Douglas-fir forest, and riparian plant communities, as these are the plant communities that commonly contain significant weed populations. These plant communities are frequently important big game winter range or sage grouse habitat.

All wildlife species would be affected to varying degrees by weed expansion. As weeds expand they displace native plant communities, thereby reducing productivity. Because weed stand plant density and diversity are usually less than the density and diversity of the native plant stand it displaces, hiding cover structure, canopy cover, and height are reduced. This may cause smaller wildlife species to abandon an area. This can reduce the utility of habitats for predators through prey density reduction as native plant foods disappear. Larger herbivores that rely on intact native plant habitats can also be affected through loss of this habitat. Abandonment can also be caused by the loss of food (seeds, forbs, and grasses) as well. Reduction of forage on big game winter range through weed expansion would severely reduce the carrying capacity of the winter range. This would result in big game mortality, particularly during severe winters, when forage is not available in sufficient quantity to support winter herds.

Indirect effects on wildlife would include reduced vegetative cover following treatment applications for a limited time until the newly planted or existing vegetation expands to occupy the sites. This would reduce the quality or utility of the habitat until vegetation recovers and may in fact displace individuals because of lack of cover or forage or both. Recovery time may include one to three growing seasons for grass communities, 2 to 5 years for forb communities, and up to and beyond 15 years for sagebrush and other shrub communities (U.S. Forest Service 2001a).

Except for very short-term disturbance, federally listed threatened, endangered, and candidate (T&E) species would not be directly affected by implementation of this alternative. Bald eagles inhabit riparian zones and low elevation drainages where weeds are present and could be disturbed during application. However, if applications occur outside the nesting period, the disturbance would be short and not significant.

There may be indirect effects through habitat alterations from weed expansion that influence prey species. Effects of weed expansion on ungulate populations would include an initial increase followed by a long-term decrease in the carrion available for bald eagles on winter ranges. Dense riparian stands preferred by the yellow-billed cuckoo do not typically have weed problems, and Canada lynx habitat is usually at higher elevations with low weed density. Grizzly bears and gray wolves roam over large areas and use many habitats, which would allow them to move from areas being disturbed by herbicide application to other habitats. However, as discussed above for big game winter range, weed expansion could greatly reduce the productivity of grass/forb habitats resulting in loss of preferred wolf and potential grizzly bear prey species that depend on that habitat. The preferred prey species

decline could lead to loss of carrying capacity for wolves and potentially grizzly bear, resulting in potential increased predation on domestic livestock to offset the lost prey base.

All sensitive wildlife species, including sage grouse and pygmy rabbits, could be temporarily disturbed during weed treatment procedures. The sagebrush and grass/forb habitats preferred by sage grouse could experience declines in productivity following weed treatment or weed expansion. This could displace the birds into other habitats, which may not be suitable and are already occupied. If sage grouse are present and large blocks of suitable unoccupied habitat are not available for potential dispersal, this would be a significant impact. Pygmy rabbit habitat could also be adversely affected by weed treatments on a short-term basis and by weed expansion on a long-term basis. Townsend's big eared bat, spotted bat, northern goshawk, peregrine falcon, and flammulated owl all occupy habitats that could be impacted by noxious weed expansion. Although the structural habitat components of these species are not likely to be affected, their prey all depend on native plant communities that are being displaced by weeds. Bat species have high energy requirements during certain times of the year and loss of prey could significantly affect the survival of those species. Flammulated owl and northern goshawk would experience carrying capacity declines as their prey bases change in response to weed expansion. This would be particularly adverse during breeding periods.

Effects on Wildlife Source Habitats. The 19 MIS species on the S-CNF would be affected in various ways. All species could be temporarily (less than 24 hours) displaced during treatment application. Adverse impacts would mainly be associated with weed expansion. Bald eagle, peregrine falcon, gray wolf, and grizzly bear (all estimated to be below minimum viable population levels in the two Forest Plans) impacts were discussed above, as were impacts to elk and mule deer on winter range. Vesper sparrow and mountain bluebird would be significantly impacted through weed expansion as they are dependent on cover and forage in shrub-steppe and grass/forb communities. The pygmy nuthatch and brown creeper feed on insects in low elevation forests, which would also decline as weed expansion displaces native plant communities. The continued expansion of weeds into wildlife habitats of the S-CNF could adversely affect the forest's ability to maintain adequate structural diversity of vegetation to ensure habitat for minimum viable populations or target populations of all wildlife species.

The extent of current inventoried weed infestation by PVG is shown in Table 3-5, *Chapter 3, Affected Environment*. These PVGs correspond roughly with wildlife source habitats discussed in Table 3-12, *Chapter 3, Affected Environment*. The North Fork Ranger District has about 57 percent of the inventoried weed-infested land on the entire S-CNF and about 75 percent of the dry forest-ponderosa pine PVG is weed infested. The dry shrub, cool shrub, and dry grass PVGs also have relatively high rates of weed infestation compared to the other vegetation types. These same PVGs are the most susceptible to future weed infestations.

Table 4-2 notes threats to wildlife families for the source habitats occurring on the S-CNF using information from Table 3-5, *Chapter 3, Affected Environment*. Habitat effects include loss and degradation of habitat quality or quantity due to current and potential future weed infestation and, to a lesser extent, increased fire risk. Habitat effects considered in this table would occur over a long term and would be based on the projected rate of spread of weeds and the expected success of control measures under each of the alternatives. Disturbance

effects include displacement of wildlife because of increased human activity during weed treatment and land rehabilitation and would be of short-term duration. Disturbance threats are directly related to the anticipated levels of human activity and the varying sensitivity of different wildlife species to human disturbance. Because there are several species in each wildlife family, disturbance threats indicate impacts to the most sensitive species within the family.

Other potential effects such as mortality from herbicide ingestion have been determined to be insignificant (see discussion under the Proposed Action) and are not addressed in Table 4-2. Note that there is not a direct correlation between the source habitats in Table 4-2 and the PVGs used in Table 3-5, *Chapter 3, Affected Environment*. Information listed in Table 4-2 primarily refers to the lower elevation forests and range lands that are most susceptible to weed infestation. This topic is discussed in greater detail in *Section 4.B.1, Vegetation Resources and Noxious Weeds*. Table 4-2 indicates that under the No Action Alternative, there would be moderate to high short-term disturbance threats and moderate to high long-term habitat threats to wildlife groups

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. A number of examples of protective BMPs and mitigation measures have been given in previous discussions of other biological resources that also provide protection for wildlife and their habitat. These include compliance with all State and Federal laws and agency guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; use of label-approved aquatic formulations near open water; use of dyes in riparian areas to provide visual evidence of treated vegetation and proper buffer avoidance; and use of weed specific herbicides on big game winter range to minimize impacts to winter forage. In addition, a 50-foot no-spray buffer zone will apply for broadcast or 'block' applications and a 15-foot buffer will apply for spot applications along all flowing water streams and ponded water bodies. Reduced buffer zones will be considered when using label-approved aquatic formulations (e.g., aquatic 2,4-D).

TABLE 4-2
Relative Threats and Benefits of the Proposed Action and Alternatives on S-CNF Wildlife Source Habitats and Groups

	No Action		Proposed Action		Alternative 1		Alternative 2	
	Long-Term Habitat Threats or Benefit	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**
Family 1 Low Elevation, Old Forest Family	Moderate to high threat	Moderate	High benefit	Moderate	Moderate benefit	Moderate	High threat	Moderate to high
Pygmy nuthatch								
Family 2 Broad Elevation, Old Forest Family	Moderate to high threat	Moderate	High benefit	Moderate	Moderate benefit	Moderate	High threat	Moderate to high
Northern goshawk (summer), flammulated owl, pine marten, fisher, pileated woodpecker, brown creeper, ruby crowned kinglet, red squirrel, yellow-bellied sapsucker, Boreal owl, great gray owl, three-toed woodpecker								
Family 3 Forest Mosaic Family	Moderate to high threat	Moderate	High benefit	High	Moderate benefit	High	Moderate threat	Moderate to high
Wolverine, lynx								
Family 5 Forest and Range Mosaic Family	Moderate to high threat	Moderate	High benefit	High	Moderate benefit	High	High threat	Moderate to high
Gray wolf, grizzly bear, mountain goat, elk, mule deer, bighorn sheep								
Family 6 Forest, Woodland, Montane Shrub Family	Moderate threat	Moderate	Moderate to high benefit	Moderate	Moderate benefit	Moderate	Moderate threat	Moderate to high
Northern goshawk (winter)								

TABLE 4-2
Relative Threats and Benefits of the Proposed Action and Alternatives on S-CNF Wildlife Source Habitats and Groups

	No Action		Proposed Action		Alternative 1		Alternative 2	
	Long-Term Habitat Threats or Benefit	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**	**Long-Term Habitat Threats or Benefit**	**Short-Term Disturbance Threats**
Family 7 Forest, Woodland, and Sagebrush Family	High threat	High	High benefit	Moderate	Moderate benefit	High	High threat	Moderate to high
Bald eagle, harlequin duck, yellow warbler, spotted frog, Townsend's big-eared bat, spotted bat, peregrine falcon								
Family 8 Rangeland and Early- and Late-Seral Forest Family	Moderate to high threat	Moderate	High benefit	High	Moderate benefit	High	High threat	Moderate to high
Mountain bluebird								
Family 10 Range Mosaic	Moderate to high threat	High	High benefit	High	Moderate benefit	High	High threat	Moderate to high
Vesper sparrow, pronghorn								
Family 11 Sagebrush	Moderate to high threat	High	High benefit	High	Moderate benefit	High	High threat	Moderate to high
Sage grouse and pygmy rabbit								

Cumulative Effects. Cumulative effects on noxious weeds resulting from treatments under the No Action Alternative combined with treatments under the three CWMAs would generally be expected to result in some localized eradication, control, and containment of noxious weeds. However, under the No Action Alternative, weed infestation on the S-CNF would be expected to continue to increase. This would reflect large-scale limitations on being able to eradicate, control, or contain new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, or to prevent or reduce the risk of the invasion of adjacent land by weeds presently occurring on the S-CNF. This cumulative effect could potentially adversely affect wildlife and their habitat through the cumulative loss of native vegetation communities. Adverse cumulative effects on wildlife and their habitat may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations. Cumulative effects from other treatment activities would be minimal. However, there would be some cumulative disturbance of wildlife resulting from other ongoing S-CNF activities, such as recreation, especially in heavily roaded areas.

b. Proposed Action

Direct and Indirect Effects. Direct and indirect impacts to wildlife and their habitat would be less under the Proposed Action than the No Action Alternative. Under the Proposed Action, weeds would be aggressively eradicated, controlled, or contained using a variety of methods, and treatment sites would be restored (where appropriate) to native vegetation following treatment. Loss of native habitat to weed infestations would decrease over time as weed populations are reduced and eliminated. All wildlife species would benefit as native plant communities are restored following weed treatment. Restored plant communities would provide improved forage, hiding cover, and reproductive cover for wildlife as plant density increases, plant canopy cover increases, plant diversity increases, and multi-layered grass/shrub canopies develop compared to the No Action Alternative and existing conditions. Improved conditions would be greatest in the northern part of the S-CNF or other areas where spotted knapweed infestations are extensive. Wildlife species relying on grassland, forb communities, riparian areas, and low elevation pine and fir forests would benefit the most, as these plant communities are the most impacted by weed infestations.

The potential for native shrub mortality was discussed in *Section 4.B.1., Vegetation Resources and Noxious Weeds*, and is expected to be minimal where aerial applications are made, likely being limited to partial leaf drop of mature shrubs. Some mortality of unprotected seedlings and young plants may occur. If mortality to non-target native vegetation should occur, it would only minimally impact dependent insectivores due to the very localized and small area affected.

Big game winter range and actual or potential sage grouse and pygmy rabbit habitat would specifically improve over the long-term through implementation of the Proposed Action. As discussed in *Section 4.B.2.b, Aquatic Resources: Proposed Action*, one year following the aerial herbicide treatment of approximately 900 acres of big game (elk and deer) winter range on the Lolo National Forest in western Montana, weed production (nearly all spotted knapweed) had declined 98 percent from 1,075 pounds per acre to 25 pounds per acre, while grass production had increased 714 percent from 350 pounds per acre to 2,850 pounds per acre (TechLine 1998).

Weed treatment techniques including mechanical, biological, controlled grazing, aerial and ground-based herbicide application, and combinations of these would be implemented under the Proposed Action. As discussed under *Section 4.B.2, Aquatic Resources*, of this chapter, 100 acres of mechanical treatment, 2,600 acres of biological treatment, 300 acres of mechanical/biological/grazing combined treatment, and 1,400 acres of mechanical/ biological/chemical/grazing combined treatment would occur annually under the Proposed Action. If any direct adverse effects were to occur, they would be expected to be localized, temporary, and minor relative to the S-CNF acreage or relative to acres currently being treated on the S-CNF each year using chemicals. Beneficial effects would be permanent and occur incrementally over a long period of time, as long as weed-infested areas recover to more natural conditions. In summary, mechanical treatment would have a somewhat longer-term displacement effect on wildlife than chemical treatments, biological control agents only feed on target plants and would have no effect on wildlife, and while strictly controlled grazing would affect habitat by removing some vegetation, the treated area would be too small to have any significant wildlife effect. Chemicals are addressed below.

Restoration of disturbed areas (where appropriate) would not be expected to adversely affect wildlife resources. There would be a short period of time when habitat values on areas being restored would be low, because of low vegetation density. As restored areas mature, effects would be beneficial as wildlife habitat values improve over existing conditions.

The greatest possibility for impacting wildlife from the Proposed Action is through the application of herbicides. Dermal contact or eating contaminated food would be the main methods of impact to wildlife from herbicides. Other weed management program EISs prepared by the Forest Service in the west have examined the impact of herbicide application on wildlife. Findings in those EISs applicable to this Final EIS are referenced herein. Spotted knapweed is the main noxious weed problem on the S-CNF and the herbicides included in this analysis to eradicate spotted knapweed include 2,4-D amine, clopyralid, dicamba, glyphosate, and picloram. These herbicides also contain "inert" ingredients, including surfactants, that are not expected to have any significant effect. The dyes and other adjuvants described in *Chapter 2, Alternatives*, are described as having little effect on wildlife populations. Mitigation measures, buffer zones BMPs, and SOPs are expected to minimize adverse impacts, if any, of these other ingredients.

There are reports that many synthetic chemicals released into the environment may disrupt normal endocrine function in a variety of aquatic life and wildlife. Some of the effects observed in animals have been attributed to some persistent organic chemicals such as polychlorinated biphenyls, DDT (dichlorodiphenyltrichloroethane), dioxin, and some pesticides. Adverse effects include abnormal thyroid function and development in fish and birds; decreased fertility in shellfish, fish, birds, and mammals; decreased hatching success in fish, birds, and reptiles; demasculinization and feminization of fish, birds, reptiles, and mammals; defeminization and masculinization of gastropods, fish, and birds; decreased offspring survival; and alteration of immune and behavioral function in birds and mammals. Some argue that these adverse effects may be due to an endocrine disrupting mechanism (EPA 1997). However, the causal link between exposure and endocrine disruption in wildlife is unclear (WHO 2002).

It is unknown whether herbicides have the same effect as DDT and other pesticide compounds. For example, 2,4-D mimics the growth hormone auxin, which in turn causes uncontrolled growth and eventually death in target plant species (Tu et al. 2001). This potential hormone disruption implicates 2,4-D as an endocrine disrupter. A recent study showed that 2,4-D does not influence male-to-female sex reversal in alligators (Guillette et al. 2000). However, little connection has been made between endocrine disruption in other wildlife or human health and herbicide use, primarily because information is not available (Safe et al., 2000). In addition, many other factors disturb wildlife growth, reproduction, and survival. Wildlife can be subject to a number of different stressors (such as habitat loss, competition, food availability, and disease) that may affect the same endocrine markers used to evaluate the effect of endocrine disrupters (Safe et al. 2002; WHO 2002). Thus, the relationship between adverse hormonal effects in wildlife and endocrine disruption remains speculative (WHO 2002).

Effect of Herbicides on Amphibians: Amphibians are potentially the most sensitive group of wildlife to herbicides because of their permeable skin and complex life cycles. Most amphibian species require moisture or some form of water to complete their life cycle, and most are aquatic in their egg or larval stages. It is unknown if the safety standards (such as buffer zones and application rates) for other kinds of vertebrates are adequate for reptiles and amphibians (Hall and Henry 1992). Carey and Bryant (1995) reviewed the numerous pathways through which amphibians could be affected by chemicals in the environment. They suggest that adult and larval amphibians are not necessarily more sensitive to chemicals than other terrestrial or aquatic vertebrates. However, sublethal effects can manifest as increased susceptibility to disease, increased predation, altered growth rates, or disrupted development. They suggest "endocrine-disrupting toxicants can have effects at tissue levels well below detectable levels," and that "toxicants designated as safe should not be considered to be free of endocrine disrupting effects until proven otherwise." As noted in *Section 4.D.1.b, Human Health and Safety: Proposed Action*, however, there is little available evidence that the herbicides proposed for use on the S-CNF are linked to endocrine disrupting activities in wildlife or humans.

Although amphibian populations have declined in pristine and polluted habitats worldwide, data are insufficient to show that endocrine disrupting compounds caused the decline (WHO 2002). Risk assessments suggest that wildlife, including amphibians, will not be *significantly* affected by herbicides at the expected exposure levels. Also, there will be *buffer zones* around water and wetlands where herbicides will not be applied. This practice will minimize the potential for amphibians to be exposed to herbicides during sensitive developmental stages. Biological and mechanical methods of weed control should have no impact on amphibians. However, during terrestrial stages, amphibians could be trampled or run over by a vehicle or mower, but such events would be rare.

Indirect Herbicide Ingestion by Wildlife: A variety of studies have investigated toxicity of herbicides on wildlife and domestic animals. The LC50s (herbicide concentration lethal to 50 percent of the test organisms) for mallard ducks and quail exceed 10,000 ppm for picloram and dicamba, 4,640 ppm for clopyralid, and 5,000 ppm for 2,4-D (U.S. Forest Service 1984). Deer and cattle feeding studies showed that deer experienced no effects from ingesting 2,4-D-treated foliage with concentrations several times higher than would likely be applied on the S-CNF (Campbell et al. 1981). Cattle fed with picloram-treated hay at concentrations

many times higher than those likely to be used on the S-CNF suffered no lethal effects (Monnig 1988). No effects were observed in heifers fed dicamba at 20,000 ppm in feed (Edson and Sanderson 1965). Monnig (1988) observed that picloram, 2,4-D, and glyphosate are excreted rather rapidly from test animals through the kidneys, and that warm-blooded test animals fed extremely high concentrations of these herbicides had either very low or undetectable concentrations of the test chemical in internal organs. Although not studied, clopyralid effects are likely to be similar to picloram, a close chemical analogue (U.S. Forest Service 2001a, d). Other studies examining black-tailed deer and glyphosate have reported similar results (U.S. Forest Service 2000a).

According to data presented by the U.S. Forest Service (1999a), 2,4-D herbicides have the worst-case LD50s (lethal dose at which 50 percent of test organisms perish) of any of the herbicides analyzed in this Final EIS. The Forest Service further presented data showing that cattle (representative of wild ungulates) and dogs (representative of wild canids) were the most sensitive groups to 2,4-D. Their analysis (U.S. Forest Service 1999a) for elk and canine predators is replicated below to show the probable effects of herbicides on these species on the S-CNF.

Immediately following a typical application rate of 1 pound of herbicide per acre, herbicide concentration on grass and forbs would be about 125 mg/kg or ppm (Monnig 1988). By comparison, concentration of picloram 90 days after application would be approximately 25 ppm (Watson et al. 1989), while concentrations of dicamba, clopyralid, 2,4-D, and glyphosate would be even lower as they break down quicker than picloram. If it is assumed that up to 2 pounds of herbicide (2,4-D) may be applied per acre (grass concentration would equal 250 ḿg/kg), an application rate that could also be used on the S-CNF, and that the animals feed on the grass immediately after application and only eat contaminated vegetation, then:

Elk: Assuming that an elk (230 kg) eats 16.4 kg/day of forage then the dosage is 250 mg/kg x 16.4 kg/elk x elk/230 kg = 18 mg/kg. Assuming that elk have a LD50 similar to cattle, then the LD50 is 100 mg/kg and the dosage only represents 18 percent of the LD50. Therefore, 2,4-D is fairly non-toxic to elk.

Another herbicide concern is long-term accumulation. Chemicals used on the S-CNF do not bioaccumulate or biomagnify and because they are water soluble, they do not accumulate in fatty tissue and are excreted rapidly (Monnig 1988). According to Monnig (1988), the maximum muscle/organ concentration of the herbicides being analyzed is 0.1 mg/kg. Using this figure the following can be determined for canids.

Canids: If a coyote (23 kg) consumes 5.5 kg of road-kill elk in a day, the dosage is 0.1 mg/kg x 5.5 kg/coyote x coyote/23 kg = 0.02 mg/kg. The LD50 (2,4-D) for dogs is 100 mg/kg, therefore this dosage represents less than 1/400th of the LD50. Herbicides would not be toxic to canids.

Additional examples involving bald eagle (two scenarios) and sage grouse follow that illustrate potential effects of 2,4-D on two avian species with different feeding habits.

Bald eagle: In the first scenario, if a bald eagle (3.2 kg) consumes 0.5 kg of road-kill elk in a single day, the dosage is 0.1 mg/kg x 0.5 kg/bald eagle x bald eagle/3.2 kg = 0.02 mg/kg. In the second scenario, if a bald eagle (3.2 kg) consumes 0.5 kg of road-kill coyote in a single

day that had previously fed on road-kill elk (as described in the above example), the dosage is 0.02 mg/kg x 0.5 kg/bald eagle x bald eagle/3.2 kg = 0.003 mg/kg. The LD50 value of 2,4-D for birds is 500 mg/kg (see Appendix G). The contaminant values of 2,4-D for these two scenarios for bald eagle are both well below the LD50 value.

Sage grouse: If a sage grouse (1.4 kg) consumes 10 percent of its body weight (0.14 kg) in grasses and forbs in a single day, then the dosage is 250 mg/kg x 0.14 kg/sage grouse x sage grouse/1.4 kg = 25 mg/kg. This value is well below (1/20th) the LD50 value of 2,4-D for birds of 500 mg/kg. Birds ingesting insects that were feeding on sprayed foliage would have similar or reduced levels of contaminants due to further dilution from insect body weights.

This analysis, and the fact that the herbicides do not bioaccumulate or biomagnify and are rapidly excreted, would indicate that there would be little or no effects to big game, predators, scavengers, or birds from herbicide application on the S-CNF. There would also be no long-term accumulation from repeated applications.

Dermal exposure test data for rabbits and rats contained in Appendix J indicate that LD50 values for chemicals that could potentially be used on the S-CNF vary from over 2,000 mg/kg for 2,4-D and picloram to over 5,000 mg/kg for glyphosate. These values greatly exceed chemical concentrations on vegetation when the chemical is applied at a rate of 2 pounds per acre (250 mg/kg for 2,4-D) and suggest that there would be limited risk to wildlife from dermal exposure to such vegetation. Analysis presented in *Section 4.D.1, Human Health and Safety*, similarly concludes that for people hiking through an area just sprayed with 2,4-D, the risk from dermal exposure and ingestion of 2,4-D through the skin would be 40 times lower than the EPA's Acceptable Daily Intake (ADI) value for 2,4-D. The ADI is the dose level determined by the EPA to be safe, even if received every day for a lifetime.

Herbicide spills would not present a hazard to wildlife as any spill would be treated as a toxic release, the area would be small, and the presence of humans cleaning up the spill would displace any wildlife in the area before they could consume lethal doses of herbicides.

The implementation of mitigation measures, BMPs, and SOPs described in this Final EIS supports the conclusion that impacts to migrating bird populations, as well as eggs and nestlings, will not be significant. Impacts would not be expected to result in violations of the Migratory Bird Treaty Act, which focuses on direct takings and not on impacting habitat. Furthermore, Executive Order 13186, which defines the responsibilities of Federal agencies to protect migratory birds under the four Migratory Bird Treaties, requires Federal agencies, within the scope of their regular activities, to control the spread and establishment in the wild of exotic animals and plants that may harm migratory birds and their habitat. Controlling the establishment and spread of exotic plants, and thereby improving and protecting existing wildlife habitat, is the objective of this project.

Benefits to wildlife T&E, sensitive, and MIS species under the Proposed Action would be considerably greater than those discussed for the No Action Alternative. All of these species would benefit from the aggressive weed treatment and restoration of habitat (where appropriate) following treatment because of a reduction in the rate of loss of native plant community productivity from weed expansion. The above analysis of herbicide toxicity also

applies to wildlife T&E, sensitive, and MIS species and indicates no adverse effects would result from herbicide application other than possibly brief displacement during application.

Effects on Wildlife Source Habitats and Minimum Viable Populations. The habitat and disturbance threats to wildlife groups under the Proposed Action were presented in Table 4-2. Long-term benefits of this alternative would be high and exceed those of all other alternatives. Expansion of weeds into wildlife habitats of the S-CNF would be slower and control of weeds better than under the No Action Alternative. Therefore, there is less potential for weeds to adversely affect the forest's ability to maintain adequate structural diversity of vegetation to ensure habitat for minimum viable populations or target populations of all wildlife species are met.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on S-CNF resources including wildlife resources. They focus on weed prevention and management BMPs and the proper air- and ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures* and examples were given in previous resource discussions in this chapter that are also protective of wildlife and their habitat. The Proposed Action, like Alternatives 1 and 2, also includes a site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy that were described in *Chapter 2, Alternatives* to avoid or minimize the potential for adversely affecting wildlife resources, especially sensitive resources and special status wildlife species at individual weed treatment sites.

Cumulative Effects. Cumulative effects of weed treatments under the Proposed Action combined with treatment effects of the three CWMAs would result in long-term benefits to wildlife because of greater levels of weed control and eradication, slower weed population spread, and less total weed-infested acreage compared to the No Action Alternative. This would result in cumulatively improved habitat conditions for wildlife on and off the S-CNF. New weeds that have invaded the S-CNF from adjacent lands would likely be eradicated, and invasion of adjacent lands by weeds presently occurring on the S-CNF would be curtailed as weed populations are controlled or eradicated. This cumulative effect would beneficially affect wildlife, T&E, sensitive, and MIS species and their habitats both on and off the S-CNF. Beneficial cumulative effects on wildlife and their habitat may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of opportunities for the eradication and control of extensive spotted knapweed infestations.

Treatment activities are closely coordinated with the CWMAs, which would virtually eliminate the potential for treatment overlap for ground and aerial herbicide applications. Since most wildlife species are relatively mobile, there is the potential for birds and animals to enter previously treated areas. However, as the preceding analyses show, any cumulative effects from herbicide ingestion or contact would be minimal. There would be some cumulative disturbance of wildlife from the combined effects of weed treatment and other ongoing S-CNF activities, such as recreation, especially in heavily roaded areas.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect benefits to wildlife would generally be similar to those described for the Proposed Action, but somewhat less pronounced or

widespread and would occur at a slower rate because of no aerial application of herbicides under Alternative 1. A combination of primarily biological treatment and ground-based application of herbicides would be used to treat weed infestations on the S-CNF. This less-aggressive approach would have a somewhat reduced beneficial end result for wildlife resources than the Proposed Action, and it would take longer to achieve widespread positive results. There would be long-term benefits to all wildlife, including T&E, sensitive, and MIS species, from the reduction in size of weed populations and subsequent expansion of native plant communities, resulting in beneficial impacts to wildlife and their habitat from less extensive weed populations. The potential for consumption impacts from herbicides would be the same as described for the Proposed Action. With no aerial application of herbicides, the chance of direct contact is minimal.

Effects on Wildlife Source Habitats and Minimum Viable Populations. The habitat benefits and disturbance threats to wildlife groups under Alternative 1 are presented in Table 4-2. This alternative would provide moderate long-term habitat benefits to wildlife groups, second only to the moderate to high benefits that would occur under the Proposed Action. Expansion of weeds into wildlife habitats of the S-CNF would be slower and control of weeds better than under the No Action Alternative but not as good as under the Proposed Action. Therefore, compared to the Proposed Action, there is greater potential for weeds to adversely affect the forest's ability to maintain adequate structural diversity of vegetation to ensure habitat for minimum viable populations or target populations of all wildlife species are met.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, together with site-specific implementation processes (decision tree, minimum tool, adaptive strategy) to avoid or minimize the potential for impacting wildlife resources. Examples of BMPs are the same as described for the No Action Alternative and Proposed Action, except for measures directed at aerial herbicide application.

Cumulative Effects. Cumulative beneficial effects of Alternative 1 combined with the treatment effects from the three CWMAs would be similar to those described in the Proposed Action. However, the effectiveness of the CWMA program could be hampered in the control of large scale or inaccessible weed infestations without the use of aerial application opportunities. Long-term cumulative effects are expected with CWMA efforts to include the continued decline of weed populations and resulting benefits to wildlife on and off the S-CNF.

Cumulative effects from herbicide treatments would be similar to the Proposed Action. Furthermore, no aerial herbicide application under this alternative would eliminate the potential for any cumulative effects from wind drift on wildlife and their habitat. There may be some cumulative but minor disturbance of wildlife from weed treatment and other ongoing S-CNF activities, similar to the Proposed Action.

d. Alternative 2

Direct and Indirect Effects. Although direct effects on wildlife would be reduced under Alternative 2, indirect adverse effects on wildlife would be greater than those expected under the Proposed Action, Alternative 1, or the No Action Alternative. Weed treatment options under Alternative 2 do not include the ground or aerial application of herbicides. Instead, mechanical and biological treatments or their combination would be the main mechanisms for weed control, containment, or perhaps limited localized eradication on the S-CNF based on realistic management goals described for this alternative in *Chapter 2, Alternatives.* While these methods have been shown to be effective, they take a considerably longer period of time to achieve a lower level of weed control than can be achieved using herbicides. The effectiveness of mechanical and biological treatment options in the eradication, control, or containment of invasive weeds can be delayed from several months to several years while the establishment and expansion of weeds continues. Consequently, it would take longer to realize comparatively fewer benefits to wildlife from the containment, control, and limited eradication of weeds. This effect would be most noticeable in the northern part of the S-CNF where by far the largest concentrations of weeds are found. There will likely be an increased potential for wildlife disturbance because of more extensive mechanical treatments. There would be no potential for possible adverse herbicide effects as described under the Proposed Action and Alternative 1 with implementation of Alternative 2.

Effects on Wildlife Source Habitats and Minimum Viable Populations. The habitat and disturbance threats to wildlife groups under Alternative 2 were presented in Table 4-2. This alternative would result in moderate to high short-term disturbance threats, moderate to high long-term habitat threats, and greater impacts on wildlife and habitat than the Proposed Action, Alternative 1, or the No Action Alternative. The continued expansion of weeds into wildlife habitats of the S-CNF could adversely affect the forest's ability to maintain adequate structural diversity of vegetation to ensure habitat for minimum viable populations or target populations of all wildlife species are met. The potential for these adverse effects is highest for Alternative 2.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including wildlife resources. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, together with site-specific implementation processes referenced previously. They do not include herbicide-related measures since there would be no herbicide application under Alternative 2.

Cumulative Effects. Beneficial cumulative effects of Alternative 2 combined with treatment effects of the three CWMAs would take longer to achieve and would be fewer than under the Proposed Action, Alternative 1, or the No Action Alternative because of no application of herbicides. Cumulative benefits include some expected localized decline, control, or containment of weed populations in some areas and resulting limited benefits to wildlife and their habitat on and off the S-CNF.

Since herbicide use is not included in this alternative, there would be no cumulative effects to wildlife from other past, present, or future herbicide treatments. There will likely be an increased cumulative potential for wildlife disturbance under this alternative from the

effects of more extensive mechanical treatments combined with the effects of other ongoing S-CNF activities. Alternative 2 would not be effective in supporting the goals and objectives of the CWMAs, thus adversely affecting these programs as well.

4.B.4. Ecosystem Function

a. No Action Alternative

Direct and Indirect Effects. Continuance of existing weed management/control activities would not halt the spread of weeds across the S-CNF, particularly on the northern end. Given the widespread nature of the weed populations compared to the acreage treated each year and their projected rate of spread, weed populations would continue to expand even with the weed treatments under this alternative. Ecosystem function would experience little to no impact from treatment of noxious weeds, but ecosystem function would be adversely affected by weed population expansion.

As weed populations expand under this alternative, the hydrologic cycle would be disrupted, as discussed in this chapter under the Aquatic and Soil Resource Sections (*Section 4.B.2, Aquatic Resources* and *Section 4.C.3, Soils, Geology, and Minerals*). Runoff and erosion would increase under weed canopies, compared to native plant communities, which would decrease infiltration on these sites. Plant transpiration from weed communities would be less than transpiration from native plant communities, because of a lower diversity and density of plants in the weed stand. Evaporation of soil moisture would increase from areas occupied by weeds, compared to native plant communities, because of the weed stands generally having a poorly developed canopy and root structure that do not protect the soil from evaporation or promote the infiltration and storage of water.

Carbon and nutrient cycles would be diminished under this alternative. Organic matter production and subsequent deposition onto soils would decrease over time, because of lower plant productivity compared to native plant communities. Lower plant productivity would also reduce the amount of other organic nutrients deposited onto the soil surface. This would reduce the amount of nutrients mineralized over time and further reduce nutrient cycling. This would lower the capability of the S-CNF to contribute to local and regional nutrient and carbon cycles and to continue to support a native, diverse plant community.

As discussed under Wildlife Resources in this chapter (*Section 4.B.2, Aquatic Resources*), weed expansion has a detrimental effect on the food chain, which impacts the food web throughout the S-CNF. This impact can arise through disruption of plant communities (primary productivity) as discussed above or through reduced support for habitat of lower trophic level prey species such as small mammals and birds. Food web stability, structure, and complexity can decline as a result of these effects.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples were provided in previous discussions of BMPs and mitigation measures in this chapter.

Cumulative Effects. Cumulative effects of the No Action Alternative combined with the three CWMAs would be expected to adversely affect ecosystem function. The CWMAs and the S-CNF weed management program together have met with some levels of success. However, under the No Action Alternative, weed infestation on the S-CNF would be expected to continue to increase. This would reflect limitations on being able to eradicate, control, or contain new weeds that have invaded the S-CNF from adjacent lands, or to prevent or reduce the risk of invasion of adjacent lands by weeds presently occurring on the S-CNF. This cumulative effect could potentially adversely affect ecosystem function, through disruption of the hydrologic, carbon, and nutrient cycles, as well as food webs, on a regional scale around the S-CNF. Ecosystem functions operate at broad landscape scales and can therefore be impacted from cumulative actions. Adverse cumulative effects may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations. Ecosystem function may be cumulatively and minimally affected by other ongoing S-CNF activities such as road and trail impacts, livestock grazing, and recreation activities near drainages. Weed treatment effects would result in some land disturbance and creation of bare surfaces, which would have short-term adverse effects on ecosystem function, but some long-term beneficial effects with the re-establishment of native plants.

b. Proposed Action

Direct and Indirect Effects. Ecosystem function direct and indirect adverse impacts would be less under the Proposed Action than the No Action Alternative. Weeds would be aggressively eradicated, controlled, or contained using a variety of methods, and treatment sites would be restored to native vegetation following treatment under the Proposed Action. Loss of native plant communities to weed infestations would decrease over time as weed populations are reduced and eliminated. As weed populations decline, the hydrologic cycle (where currently altered) would return to operating within normal parameters for the S-CNF. Runoff would decrease, thereby encouraging infiltration of precipitation and subsequent plant transpiration and recharge of aquifers. Plant productivity decline would be less with the Proposed Action as native plant community establishment on eradicated weed sites would restore nutrient and carbon cycles over time. Food web support would be higher under the Proposed Action than other alternatives as weed management is the most aggressive under the Proposed Action.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper ground-based and aerial application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures* and examples are given for the Proposed Action in previous resource discussions in this chapter.

Cumulative Effects. Cumulative effects of the Proposed Action combined with the three CWMAs would result in a net benefit to ecosystem function because of increased higher levels of weed control and eradication, slower weed population spread, and less total weed-infested acreage compared to existing conditions. This would result in an improved hydrologic cycle, nutrient and carbon cycles, and food web support on and off the S-CNF, as new weeds that have invaded the S-CNF from adjacent lands would be eradicated and invasion of adjacent lands by weeds presently occurring on the S-CNF would be curtailed as

populations are controlled or eradicated. This cumulative effect would beneficially affect all ecosystem resources, such as aquatic organisms, wildlife, humans, and plant communities. Beneficial cumulative effects may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of eradication and control of extensive spotted knapweed infestations. Other cumulative effects on ecosystem function would be similar to those described for the No Action Alternative. They include the continuing effects on ecosystem function from other ongoing S-CNF activities or features (roads, livestock grazing, recreation) and from the short-term disturbance but long-term revegetation of treatment areas.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect effects on ecosystem function would be similar to those described for the Proposed Action, but would occur at a slower pace because of no aerial herbicide application in Alternative 1. A combination of biological treatment and ground-based application of herbicides would be applied to the large blocks of weed infestations on the S-CNF, instead of aerial herbicide application. This less aggressive approach may have similar end results as the Proposed Action, but would take longer to achieve, be less effective in treating weeds and less successful in improving altered conditions in remote, difficult to access locations.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.*

Cumulative Effects. Cumulative beneficial effects on ecosystem function of Alternative 1 combined with the treatment effects from the three CWMAs would be similar to those described in the Proposed Action. These include the expected decline of weed populations with subsequent improvements in hydrologic, nutrient, and carbon cycles and in food web support on and off the S-CNF. However, the effectiveness of the CWMA program could be hampered in the control of large scale or inaccessible weed infestations without the use of aerial application opportunities. No aerial herbicide application under this alternative also would eliminate the potential for any cumulative effects from wind drift on ecosystem function. There may be some cumulative but minor disturbance of ecosystem function from weed treatment and other ongoing S-CNF activities, similar to the Proposed Action.

d. Alternative 2

Direct and Indirect Effects. Direct and indirect adverse effects on ecosystem function would be greater than those described for the Proposed Action, Alternative 1, and the No Action Alternative. Weed treatment methods in Alternative 2 do not consider ground- or air-based application of herbicides. Instead, biological and mechanical treatments would be the main mechanisms for weed control or containment and some eradication on the S-CNF. While these methods have been shown to be effective, they take a considerably longer period of time to achieve the same or lesser levels of control as achieved using herbicides. The effectiveness of mechanical and biological treatment options in the eradication, control, or containment of invasive weeds can be delayed from several months to several years while

the establishment and expansion of weeds continues. Consequently, it would take longer to realize fewer ecosystem benefits under this alternative than the other alternatives. This effect would be most noticeable in the northern part of the S-CNF where the largest concentrations of weeds are found.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on S-CNF resources. They focus on weed prevention and management BMPs and the proper application of biological control vectors. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Examples presented for the Proposed Action and other alternatives except those directed at the use of herbicides also apply to Alternative 2.

Cumulative Effects. Cumulative impacts of Alternative 2 combined with the three CWMA treatment programs and with other ongoing activities on the S-CNF would be similar in nature but would result in fewer beneficial effects and more adverse effects than anticipated under the Proposed Action, Alternative 1, or the No Action Alternative. Ecosystem function would be expected to gradually decline under Alternative 2. The greatly increased use of mechanical weed treatments and associated extensive soil disturbance under Alternative 2 also would contribute to cumulative adverse effects on ecosystem function when combined with other activities occurring on the S-CNF. Implementation of Alternative 2 would not be expected to result in a successful long-term weed treatment program, effective or successful CWMA objectives, or in healthy ecosystem functions on weed-infested areas of the S-CNF.

4.C. Physical Resources

4.C.1. Surface Water

a. No Action Alternative

The direct and indirect adverse effects of noxious weeds on surface water quality and hydrology under the No Action Alternative were discussed in *Section 4.B.2, Aquatic Resources,* of this chapter because surface water affects fish, aquatic invertebrates, and their habitat. Surface water effects are very briefly summarized here. These effects would be expected to be similar to or slightly greater than under existing conditions because of expected increases in weed infestations under the No Action Alternative. The Forest Service (1999a, 2001d) reported that the establishment of invasive weeds such as knapweed and sulphur cinquefoil within or adjacent to riparian habitats could increase overland runoff and sediment yield from such habitats. Lacey et al. (1989) reported a three-fold increase in sediment yield and a 50 percent increase in runoff at a knapweed-infested site compared to a non-infested site. Hickenbottom (2000) reported that a site with 80 percent knapweed cover yielded five times the amount of sediment as a site covered with bunchgrass. Increased sediment delivery to drainages can cause increased levels of turbidity and suspended sediment in the water column and sedimentation of instream habitat. This can adversely affect aquatic resources as described previously in *Section 4.B.2, Aquatic Resources.*

Increased runoff from weed-infested sites may result in local, short-term variations in a stream's hydrograph, but this would not be expected to alter a drainage's seasonal flow regime. The status of 303(d)-designated water bodies on most of the S-CNF would not be

expected to change under the No Action Alternative. However, there could be minor increases in sediment delivery, especially in the more northern portions of the S-CNF, because of expected increases in weed infestations. This may have an effect on achieving or maintaining designated beneficial uses in northern drainages on the S-CNF.

The use of herbicides and other weed treatment methods on the S-CNF would continue under the No Action Alternative at the current treatment rate of approximately 3,000 to 3,500 acres per year. Weed treatment activities would continue to be implemented according to all of the BMPs and mitigation measures described for the No Action Alternative in *Chapter 2, Alternatives*. As discussed previously, what little data that have been gathered on the S-CNF (Rose 2002) indicate that these activities have not impacted surface water quality, hydrology, 303(d)-designated water bodies, or designated beneficial uses on water bodies on the S-CNF and, therefore, they would not be expected to under the No Action Alternative.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including surface water quality. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples aimed at the protection of surface water quality include compliance with restrictions stating no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; use of label-approved aquatic formulations near open water; application of herbicides in accordance with EPA registration label requirements and restrictions; compliance with all State and Federal laws and agency guidelines during herbicide application; and restoration of disturbed and barren treatment areas where appropriate. In addition, a 50-foot no-spray buffer zone will apply for broadcast or 'block' applications and a 15-foot buffer will apply for spot applications along all flowing water streams and ponded water bodies. Reduced buffer zones will be considered when using label-approved aquatic formulations (e.g., aquatic 2,4-D).

Cumulative Effects. As described in *Section 4.B.2, Aquatic Resources,* cumulative effects associated with the No Action Alternative combined with treatments under the three CWMAs could potentially adversely affect water quality through increased erosion and sediment delivery to drainages, resulting from expected increases in weed infestations plus the effects of treating, disturbing, and exposing soil surfaces. Adverse cumulative effects on surface water quality may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations. Additional cumulative effects on water quality may result from other ongoing S-CNF activities that potentially contribute sediment to drainages, such as road and trail maintenance and construction, livestock grazing, and recreational activities near drainages.

b. Proposed Action

Direct and Indirect Effects. *Section 4.B.2, Aquatic Resources,* of this chapter contains detailed discussions on the effects of weeds and weed treatments on surface water quality and aquatic resources under the Proposed Action. Much of that assessment addresses the effects of worst-case situations involving herbicide applications, including surface runoff, leaching, wind drift, and accidental spills. In summary, the direct and indirect effects of weed treatment under the Proposed Action would be expected to result in some improvement in

surface water quality on the S-CNF and have a positive effect on achieving or maintaining beneficial uses. Weed infestations would progressively decline, reducing the potential for erosion and sediment delivery to drainages and improving water quality, particularly in the northern part of the S-CNF. It is unlikely that any of the worst-case herbicide situations that were analyzed would occur because of the implementation of BMPs and mitigation measures, and use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy. If worst-case situations did occur, the scenarios involving herbicide runoff and leaching of herbicides would have a very minor effect on surface water quality and would not result in impacts on populations of fish and aquatic invertebrates. Potential short-term impacts on surface water quality could occur if there were an accidental spill of a relatively toxic herbicide in a small drainage. Resultant effects may be localized depending on various factors, including the volume of spill and dilution by the receiving water. Adherence to BMPs and mitigation measures would reduce the likelihood of such a spill occurring. Adherence to BMPs and mitigation measures associated with the aerial application of herbicides would minimize or avoid the potential occurrence of wind-drift-related impacts on surface water quality.

The mechanical treatment of weed sites under the Proposed Action could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. However, these effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance, followed by the reclamation and restoration (where appropriate) of treated areas. Site restoration activities, such as seeding, transplanting, and fertilizing, would not adversely affect water quality. Seeding and transplanting activities would involve only limited soil disturbance, and fertilizer application rates would follow Forest Service and manufacturer guidelines. Any runoff of fertilizers would not be expected to be great enough to enrich streams.

BMPs and Mitigation Measures. A total of 59 BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including water quality. All of these measures are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* A number of examples specifically directed at water quality that were described for the No Action Alternative also apply to the Proposed Action. Examples of several additional measures associated with aerial herbicide application directed at water quality and other resource protection include: obtain a weather report prior to spraying, use proper aircraft speed and height to reduce wind drift potential, and monitor wind speed and direction. In addition, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives*. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources.

Cumulative Effects. Cumulative effects of the Proposed Action combined with the three CWMAs would result in increased levels of weed treatment success and the progressive decline of weed infestations. This would potentially benefit surface water quality through reduced erosion and sediment delivery to drainages. Beneficial cumulative effects may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations that would be aggressively managed.

No adverse downstream cumulative effects on water quality on non-National Forest land would be expected from worst-case situations involving herbicide runoff or leaching because of the extremely low concentrations. There is the potential for downstream adverse effects on surface water quality if a herbicide spill or wind-drift-related impact occurred close to Forest Service boundaries. Increased flows proceeding downstream would further dilute the herbicide. Weed management BMPs and mitigation measures described previously are designed to prevent or reduce the risk of these types of impacts from occurring. Other cumulative effects would generally be similar to those described for the No Action Alternative, including effects from sediment delivery from other ongoing S-CNF activities and from treating and disturbing/exposing soil surfaces. Long-term benefits through sediment reduction would result from the re-establishment of native vegetation in previously treated, weed-infested areas.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect effects on surface water under Alternative 1 would generally be similar to those effects described for the Proposed Action, except there would be no aerial application of herbicides. Benefits to surface water quality resulting from reductions in erosion and sediment delivery from weed-infested areas would still be expected, but would take longer to achieve and be somewhat less effective than under the Proposed Action.

Several of the examples of worst-case situations associated with the aerial application of herbicides could not occur under Alternative 1 because of differences in treatment techniques. The other examples of worst-case situations regarding the surface runoff of picloram and 2,4-D amine applied in a single day, leaching of herbicides, and an accidental herbicide spill could potentially occur under Alternative 1. Resultant effects on surface water quality would be the same as described for the Proposed Action, and would be expected to be negligible or short-term and localized.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 would be the same as for the Proposed Action except for measures dealing with the aerial application of herbicides. Alternative 1, like the Proposed Action, also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy.

Cumulative Effects. Cumulative beneficial effects of Alternative 1 combined with the treatment effects from the three CWMAs would be similar to those described in the Proposed Action. However, the effectiveness of the CWMA program could be hampered in the control of large scale or inaccessible weed infestations without the use of aerial application opportunities. Long-term cumulative effects are expected with CWMA efforts to include the continued decline of weed populations and resulting benefits to surface water quality on and off the S-CNF. No aerial herbicide application under this alternative also would eliminate the potential for any cumulative effects from wind drift on surface water quality. There may be some cumulative but minor effect on surface water quality from weed treatment and other ongoing S-CNF activities, similar to the Proposed Action.

d. Alternative 2

Direct and Indirect Effects. The magnitude of direct and indirect benefits to surface water quality under Alternative 2 would be expected to be less than under the Proposed Action, Alternative 1, or the No Action Alternative. Because fewer methods would be used to treat weeds under Alternative 2 and because it is only realistic to control or contain rather than reduce the size of weed infestations under Alternative 2, it would take longer to achieve lesser levels of weed treatment success than anticipated under the Proposed Action, Alternative 1, or the No Action Alternative. As a result, it also would take longer to realize some benefits to surface water quality resulting from reduced erosion and sediment delivery at weed-infested sites to drainages. Increased direct and indirect impacts to surface water quality would likely occur due to the increase in soil disturbance resulting from mechanical treatment activities. This would be especially true on the northern part of the S-CNF where weed infestations are substantially greater than on any other area of the S-CNF. The effectiveness of mechanical and biological treatment options in the eradication, control, or containment of invasive weeds can be delayed from several months to several years while the establishment and expansion of weeds continues. There would be no potential for any of the worst-case situations described for herbicides under the other alternatives to occur under Alternative 2.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including surface water quality. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples presented for the Proposed Action and other alternatives except for those directed at the use of herbicides, also apply to Alternative 2.

Cumulative Effects. Beneficial cumulative effects of Alternative 2 combined with treatment effects of the three CWMAs would be fewer than under the Proposed Action, Alternative 1, or the No Action Alternative. The success of the coordinated CWMA program would be severely hampered under Alternative 2. It would take longer to achieve a lesser level of success because of the absence of the application of herbicides. In some instances, these long-term results may include the expected gradual decline in noxious weeds and some resultant gradual benefits to surface water quality on and possibly adjacent to the S-CNF. Adverse cumulative effects on surface water quality under Alternative 2 would be greater than those described for the Proposed Action and other alternatives regarding sediment delivery from other ongoing S-CNF activities or features (roads and trails, livestock grazing, recreation near drainages). There would be no potential under Alternative 2 for adverse cumulative effects on the S-CNF or adjacent lands from herbicide application.

4.C.2. Groundwater

a. No Action Alternative

Direct and Indirect Effects. The No Action Alternative would not affect groundwater resources or drinking water quality. Potential effects of the expansion of noxious weeds on water quality would be limited to surface waters, as previously discussed in *Section 4.C.1, Surface Water*, of this chapter and to possibly reduced surface infiltration and correspondingly reduced groundwater storage at weed infestation sites (see discussions of

ecosystem function and soils in this chapter). Herbicides and other weed treatments would continue to be used on the S-CNF at the current treatment rate of approximately 3,000 to 3,500 acres per year. As discussed previously, limited monitoring studies on the S-CNF (Rose 2002) indicate that current weed treatment activities have not adversely impacted resources on the S-CNF. Therefore, they would not be expected to occur or would have negligible impact under the No Action Alternative.

BMPs and Mitigation Measures. Weed treatments would continue to be implemented according to all of the BMPs and mitigation measures described for the No Action Alternative in *Section 2.D.3, Management Practices and Mitigation Measures*. These BMPs and mitigation measures are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including groundwater resources and drinking water quality. Examples of BMPs directed at protecting water quality were listed in the discussion of surface water and include the use of buffers around water bodies, and restricted use of herbicides such as picloram that are persistent and mobile in the environment. Also, no use of chemicals is allowed within 100 feet of any potable water spring development.

Cumulative Effects. The No Action Alternative combined with the effects of the three CWMAs and other ongoing S-CNF activities (recreation, grazing, roads) would not be expected to have a cumulative effect on groundwater resources or drinking water quality on the S-CNF or on adjacent non-National Forest lands through the application of BMPs and mitigation measures.

b. Proposed Action

Direct and Indirect Effects. *Section 4.B.2, Aquatic Resources,* of this chapter discusses the potential for weed treatments to affect groundwater quality (and subsequently surface water and aquatic resources) by the leaching of herbicides through the soil. If the worst-case situation involving leaching of herbicides that was discussed did occur, it would have a very minor or negligible effect on groundwater quality and would not be expected to result in violations of drinking water standards. This conclusion is supported by various reviews and studies briefly summarized in the following text.

The Forest Service (1999a) reviewed studies on the occurrence of picloram (a mobile, persistent herbicide) in coarse soils in western Montana following its application at a rate of 1 pound per acre (Watson et al. 1989). Picloram concentrations in the upper 5 inches of soil in the western Montana studies ranged from 205 to 366 ppb; the maximum concentration measured at soil depths between 30 and 40 inches was 24 ppb. No picloram was measured in shallow groundwater wells (detection level = 0.5 ppb or 0.0005 mg/L) (Forest Service 1999a). In other studies of less-persistent herbicides reviewed by the Forest Service (1999a), clopyralid was never detected at soil depths greater than 10 inches, and after 30 days 2,4-D was never detected at soil depths greater than 2 inches (Rice et al. 1992) . In those same studies, picloram was detected at soil depths between 10 and 20 inches within 30 days following spraying, but it was not detected (detection level = 10 ppb or 0.01 mg/L) at a soil depth greater than 10 inches 1 or 2 years after spraying (Rice et al. 1992). The Forest Service (1999a) concluded that there is relatively little risk of the deep leaching of picloram, clopyralid, or 2,4-D; they assumed results would be similar for the herbicide dicamba, even though it was not tested, because its persistence and mobility are similar to those of 2,4-D and clopyralid. The Forest Service cited other studies (U.S. Forest Service 1984) showing

there is little probability of carryover of 2,4-D or dicamba in soils from one summer to the following spring because of their short half-lives, and thus limited opportunity for these herbicides to accumulate in the soil and migrate into groundwater. In their reviews of forest chemicals, Norris et al. (1991) stated that the "leaching of chemicals through the soil profile is a process of major public concern, but it is the least likely to occur in forest environments."

It is similarly expected that any concentrations of herbicides that may leach through soils and reach groundwaters on the S-CNF would be so low or negligible that they would not pose a risk to drinking water quality. It is anticipated that picloram application rates on the S-CNF would typically range from .5 to 1 pound per acre when treating spotted knapweed sites, the most prevalent weed species (as compared to 1 pound per acre in the western Montana studies), and would therefore be less likely to occur in soil concentrations great enough to subsequently adversely affect groundwater.

BMPs and Mitigation Measures. All of the BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures* would be implemented under the Proposed Action. These BMPs and mitigation measures are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including groundwater resources and drinking water quality. Examples involving buffers around water bodies, potable springs, and restrictions on the use of mobile, persistent herbicides that were given for the No Action Alternative also apply to the Proposed Action. Other examples given for surface water protection under the Proposed Action regarding the aerial application of herbicides would also contribute to groundwater protection. In addition, the site-specific implementation process, decision tree, and minimum tool approach described in *Chapter 2, Alternatives* and the Herbicide Leaching Sensitivity Evaluation System presented in Appendix F would be used under the Proposed Action (and Alternatives 1 and 2) to consider treatment site characteristics such as soil permeability and leaching potential to avoid or minimize the potential for adverse impacts on groundwater resources.

Cumulative Effects. The Proposed Action combined with the effects of CWMA treatments plus other ongoing S-CNF activities would not be expected to cumulatively affect groundwater resources or drinking water quality on the S-CNF or on adjacent non-National Forest lands through the application of BMPs and mitigation measures.

c. Alternative 1

Direct and Indirect Effects. The potential effect of Alternative 1 on groundwater resources would be the same as described for the Proposed Action. In a worst-case situation, this could include a very minor or negligible effect on groundwater quality that would not be expected to result in violations of drinking water standards.

BMPs and Mitigation Measures. The same BMPs and mitigation measures (except those for aerial herbicide application) and the same site-specific implementation and minimum tool processes that were described for the Proposed Action would be implemented under Alternative 1.

Cumulative Effects. Alternative 1 combined with the effects of CWMA treatments plus other ongoing S-CNF activities (recreation, roads, livestock grazing near drainages) would not be expected to cumulatively affect groundwater resources or drinking water quality on

the S-CNF or on adjacent non-National Forest lands through the application of BMPs and mitigation measures.

d. Alternative 2

Direct and Indirect Effects. Lack of timely and/or successful treatment of weed infestations under Alternative 2 could ultimately affect groundwater quantity due to reduced groundwater recharge. Because herbicides would not be used in this alternative, there would be no potential for a worst-case situation of herbicides leaching into groundwater.

BMPs and Mitigation Measures. The same BMPs and mitigation measures (except those for aerial and ground-based herbicide application) and the same site-specific implementation and minimum tool processes that were described for the Proposed Action would be implemented under Alternative 2.

Cumulative Effects. Alternative 2 together with the combined effects of CWMA treatments and other ongoing S-CNF activities would not be expected to cumulatively impact groundwater resources or drinking water quality on the S-CNF or on adjacent non-National Forest lands.

4.C.3. Soils, Geology, and Minerals

a. No Action Alternative

Direct and Indirect Effects. As described in *Section 4.B, Biological Resources,* of this chapter, weed populations on the S-CNF, particularly in the north, would continue to expand even with the weed control treatments of the No Action Alternative. Soils, geology, and minerals would experience little to no impact from treatment of noxious weeds, but soils would be affected by weed population expansion. There is the potential for minimal impacts to soils from off-road chemical treatment activities. Cross-country travel during treatment activities could be a limited source of soil displacement.

As weed populations expand under the No Action Alternative, soil erosion would be expected to increase. Lacey et al. (1989) found that sediment yield from knapweed-infested sites can increase three times over that found on sites occupied by native vegetation. This could result in a significant increase in sediment yield to streams, particularly in the northern areas of the S-CNF where spotted knapweed has infested more than 29,000 acres. The organic matter content of soils under weeds would decrease over time, because of lower plant productivity compared to native plant communities. This would reduce the capability of soil to support plant growth. As weeds expand under this alternative, progressively larger areas of the S-CNF would have lower soil productivity, which may require fertilization of areas being restored following weed treatment, thereby increasing overall S-CNF weed management costs.

The soil type can influence which weed treatment is appropriate for an area, and soil properties associated with each soil type can lead to indirect effects on other resources from weed treatments. Soil properties that can indirectly affect other resources include those that control water runoff, regulate water infiltration, bind chemicals to the soil, and determine water-holding capacity of the soil. These soil properties would include soil particle size distribution, clay content, and organic matter content. As the percentage of large soil

particles (e.g., gravel, cobble, rock) increases or soil textures become coarser, water infiltration increases and water runoff decreases. As clay content increases, the quantity of water able to infiltrate into the soil decreases and runoff increases. Organic matter and clay particles tend to adsorb herbicide molecules and the greater the percentage of organic matter and clay, the lower the possibility of leaching loss to the groundwater. The resources most likely to be indirectly affected by these soil properties are aquatic resources and water quality. The reader is directed to the previous impact assessments in this chapter for an in-depth discussion of those resources.

The discussion presented for aquatic resources noted that soil types associated with locations assessed in the worst-case analyses indicate runoff-dominated conditions in the Upper Little Lost HUC 5 (Lost River Ranger District) and the Challis Creek HUC 5 (Challis Ranger District) and infiltration-dominated conditions in the Middle Lemhi HUC 5 (Leadore Ranger District) and the North Fork HUC 5 (North Fork Ranger District). Appendix I provides information on the percentage abundance of different soil types in each HUC 5 within the S-CNF that can be used to infer soil permeability. Very generally, the most frequently occurring predominant soil types by Ranger District tend to consist of the following: Challis Ranger District (volcanic, sedimentary, and quartzite); Leadore Ranger District (quartzite); Lost River Ranger District (sedimentary); Middle Fork Ranger District (volcanic and quartzite); North Fork Ranger District (quartzite and granitic); Salmon-Cobalt Ranger District (volcanic, quartzite, and granitic); and Yankee Fork Ranger District (volcanic, quartzite, and sedimentary). The predominance of quartzite soils, which are among the more permeable soil types, in the North Fork HUC 5 where the majority of noxious weeds that have been inventoried on the S-CNF occur illustrates the importance of considering site-specific characteristics before beginning weed treatments.

Soil properties can also influence the type of treatment that may be appropriate on a given site. Soil properties are generally associated with the soil types derived from specific parent material sources. While this information is useful for early planning activities, it is no substitute for on-the-ground soil investigations prior to determining treatment options, but it can alert the planning team to potential constraints. As discussed in *Chapter 3, Affected Environment*, soils derived from four parent materials are common on the forest; granite, quartz, sedimentary, and volcanic. Projects located on volcanic or quartz soils can have potential leaching problems due to high rock fragment percentages, where projects located on sedimentary and granitic soils may have lower rock fragment percentages and less leaching potential. However, the expected soil textures (especially for granitics) are the reverse of this. The percentage of fine-grained soil particles can be high in volcanic and sedimentary soils and projects located on those soil types may be susceptible to problems associated with runoff if the fine-textured soil horizons retard infiltration. On the positive side, fine-textured soils tend to adsorb herbicide molecules and reduce leaching potential. Site investigations should be used to verify what soil conditions are present at the project location and then use the Herbicide Leaching Sensitivity Evaluation System in Appendix F and the decision tree in *Chapter 2, Alternatives* to determine the appropriate treatment method. These investigations take into consideration the effects of coarse soil fragments and soil texture in determining leaching potential and whether a treatment site is likely runoff-dominated or infiltration-dominated.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including soils, geology, and minerals. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Numerous examples of BMPs and mitigation measures have been presented in discussions of other resources in this chapter that also serve to protect and ensure the proper function of soils.

Cumulative Effects. Cumulative effects of the No Action Alternative combined with the three CWMAs would potentially adversely affect soils, but not geology or minerals, through increased erosion from weed-infested sites and possibly from erosion of disturbed and/or barren weed treatment areas. Adverse cumulative effects on soils may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations. Cumulative effects on soil erosion also could result from other ongoing S-CNF activities, such as roads and trail construction and maintenance, livestock grazing, and recreation activities.

b. Proposed Action

Direct and Indirect Effects. Direct and indirect impacts on soils would be less under the Proposed Action than the No Action Alternative. Under the Proposed Action, weeds would be aggressively eradicated, controlled, and/or contained using a variety of methods, with treatment sites restored to native vegetation, where necessary, following treatment. Loss of native habitat to weed infestations would decrease over time as weed populations are reduced and eliminated. Soil erosion would decrease as native plant communities become restored either through natural or artificial processes following weed treatment. Declines in soil productivity would diminish with the Proposed Action as native plant communities become established on eradicated weed sites and restore the nutrient and organic matter balance over time. The effects of eroded soils and sediment delivery on aquatic resources and surface water were discussed previously in this chapter. There is the potential for minimal impacts to soils from off-road chemical treatment activities. Cross-country travel during treatment activities could be a limited source of soil displacement.

As shown in Appendix B, the highest concentrations of weeds are found on the North Fork Ranger District (North Fork, Indianola, Shoup, and Colson Owl HUC 5s) and the Salmon-Cobalt Ranger District (Lower Panther Creek and Lower Camas Creek HUC 5s). The predominant weed species is spotted knapweed. Weed control efforts are likely to concentrate in these areas due to the size of the infestations. Appendix I indicates that quartzite and granitic-derived soils are predominant in the heavily weed-infested North Fork Ranger District HUC 5s and volcanic, granitic, and quartzite-derived soils predominate in the heavily weed-infested Salmon-Cobalt Ranger District HUC 5s. Both the quartzite and granitic soils are susceptible to leaching due to abundant coarse fragments and coarse soil textures. Projects located near streams or near high-water table areas should take this into consideration as per the decision tree (*Chapter 2, Alternatives*). The volcanic soils on the Salmon-Cobalt Ranger District would be most likely to retain herbicides in the soil profile, but surface runoff may be a problem there if clay content is high. The Proposed Action would not affect geology or minerals.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action focus on weed prevention and management BMPs and the proper ground-based and aerial application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* The Proposed Action, like Alternatives 1 and 2, also includes site-specific implementation processes that consider soil characteristics such as permeability and leaching potential (see Appendix F) to avoid or minimize the possibility of impacting other S-CNF resources as a result of herbicide application.

Cumulative Effects. Cumulative effects of the Proposed Action combined with the effects of the three treatment CWMAs would result in a benefit to soil resources because of increased levels of weed control and eradication, slower weed population spread, and less total weed-infested acreage compared to existing conditions. This would result in improved soil protection and reduced erosion both on and off the S-CNF. New weeds that have invaded the S-CNF from adjacent lands would be eradicated and invasion of adjacent lands by weeds presently occurring on the S-CNF would be curtailed as populations are controlled or eradicated. This cumulative effect would beneficially affect all resources affected by erosion, such as surface water quality and aquatic organisms. Beneficial cumulative effects on soils and related resources may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of eradication and control of extensive spotted knapweed infestations. There would be potential short-term cumulative adverse effects from these treatment activities because of mechanical ground disturbance and exposure of barren soils, but long-term benefits would result from the re-establishment of native vegetation. Some adverse cumulative effects on soils also may result from other ongoing S-CNF activities (roads, recreation, livestock grazing) within or adjacent to weed treatment locations.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect benefits to soils would generally be the same as described for the Proposed Action, but would occur at a slower rate and be somewhat less effective and widespread because of no aerial application of herbicides under Alternative 1. A combination of primarily biological treatment and ground-based application of herbicides would be used to treat weed infestations on the S-CNF under Alternative 1. This less aggressive approach would have a similar beneficial end result as the Proposed Action, but it would take longer to achieve. The lack of aerial options in remote, inaccessible areas would result in a less effective, less successful weed treatment program under this alternative than the Proposed Action. There would be long-term benefits to soils from the reduction in size of weed populations and subsequent reduction in erosion. Alternative 1 would not affect geology and minerals.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 focus on weed prevention and management BMPs and the proper ground-based application of herbicides. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, together with site-specific implementation processes described previously to avoid or minimize the potential for soils-related impacts on other S-CNF resources.

Cumulative Effects. Cumulative beneficial effects of Alternative 1 combined with the treatment effects from the three CWMAs would be similar to those described in the Proposed Action. However, the effectiveness of the CWMA program could be hampered in the control of large scale or inaccessible weed infestations without the use of aerial application opportunities. Long-term cumulative benefits include the expected decline of weed populations with subsequent reduction of erosion on and off the S-CNF. Cumulative adverse effects include soil disturbance/exposure from weed treatment activities and from other ongoing S-CNF activities.

d. Alternative 2

Direct and Indirect Effects. Any direct and indirect benefits to soils under Alternative 2 would be considerably less than those described for the Proposed Action, Alternative 1, or the No Action Alternative. Weed treatment methods under Alternative 2 do not include the ground- or air-based application of herbicides. Instead, mechanical and biological treatments or their combination would be the main mechanisms for weed containment, control, or some eradication on the S-CNF. While these methods have been shown to be effective, they take a considerably longer period of time to perhaps achieve a lesser level of weed control than can be achieved using herbicides. Consequently, it would take longer to realize probably limited benefits to soils under this alternative, especially in the northern part of the S-CNF where the largest concentrations of weeds are found. In addition, the expanded use of mechanical treatments necessary to support eradication and containment goals described for Alternative 2 in *Chapter 2, Alternatives* would result in much greater soil disturbance, exposure, and potentially erosion than under the other alternatives. This direct effect, together with the indirect effects resulting from delays in being able to respond to and reduce weed infestations, would adversely affect other S-CNF resources. Alternative 2 would not affect geology and minerals.

BMPs and Mitigation. BMPs and mitigation measures associated with weed management under Alternative 1 are designed to avoid or minimize the potential for adverse effects on S-CNF resources, including soils, geology, and minerals. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, together with site-specific implementation processes described previously except for those processes associated with herbicide application.

Cumulative Effects. Cumulative impacts on soils of Alternative 2 combined with the three CWMA treatment programs and with other ongoing activities on the S-CNF would be similar in nature but would result in fewer beneficial effects and more adverse effects than anticipated under the Proposed Action, Alternative 1, or the No Action Alternative. The greatly increased use of mechanical weed treatments and associated extensive soil disturbance under Alternative 2 also would contribute to cumulative adverse effects on soils when combined with other activities occurring on the S-CNF. Implementation of Alternative 2 would not be expected to result in a successful long-term weed treatment program, effective or successful CWMA objectives, or in healthy soil conditions on weed-infested areas of the S-CNF.

4.C.4. Land Uses and Designations

a. Commercial and Recreation Uses

1) No Action Alternative

Direct and Indirect Effects. The No Action Alternative would have little or no effect on noxious weed invasion. The spread of existing and new noxious weed species would likely continue under the No Action Alternative. These populations would likely spread into adjoining areas not managed by the S-CNF. The impact on resource-based commercial and recreational uses would be significant. Some studies (Hirsch and Leitch 1996) have estimated a loss of $3.95 per wildland acre on other National Forest lands; a similar figure should be expected on the S-CNF. Using Hirsch's and Leitch's loss calculation figure of $3.95 per wildland acre, loss on the S-CNF can be conservatively estimated at $262,964 based on 66,537 acres of inventoried weed infestations. This figure would rise as weed infestations expand, and new species of invaders encroach on the S-CNF. Wildlife is important to many outdoor recreation activities, including consumptive activities such as hunting and fishing, and non-consumptive activities such as wildlife watching and photography. These uses and associated expenditures are described further below. The economic impacts that result from weed-caused changes to wildlands are decreases in wildlife- and recreation-associated expenditures.

Commercial use of native plants on the S-CNF has not been fully documented, but it is likely that commercial gathering of these plants would be directly affected by the continued spread of weeds.

Under the No Action Alternative, invasive weeds would continue to affect commercial and recreational values on the S-CNF—and in the communities that rely on a healthy forest ecosystem. Wildlands provide important habitat for vegetation and wildlife. In turn, wildlife is an important part of many outdoor commercial and recreational activities. Wildlife and outdoor use can be divided into two types: consumptive and non-consumptive. Consumptive use consists of hunting and fishing. Expenditures for consumptive use include the sale of licenses, gasoline, lodging, food, guns and ammunition, and other goods and services (like outfitting and guide fees). Non-consumptive, or recreational, use include photography, wildlife watching, hiking, camping, and white-water rafting. Expenditures for non-consumptive use include fees for guides and outfitters, pack trips, lodging, camping equipment, and public or private land use fees.

As discussed in *Chapter 3* in *Section 3.D.4, Land Uses and Designations,* some 90 percent of travelers return to areas in and around the S-CNF after their initial visit. Hunting and fishing account for more than $340 million a year in the State of Idaho, and much of this occurs in the central mountains of Idaho and the S-CNF. Tourism in central Idaho accounts for an additional $200+ million each year. Tourism supplies more than 600 jobs in Custer County, more than 200 in Lemhi County, and less than 50 in Butte County. As scenic values and wildlife habitat are impacted by noxious weed invasions, a decline in recreational- and commercial-use dollars can be expected.

Direct economic impact is the result of changes in expenditures that affect suppliers of recreational goods and services. The Idaho Department of Agriculture concludes that the state spends more than $300 million each year in attempts to control noxious weeds.

Although Idaho has not conducted a survey to determine the commercial impact of noxious weed infestations on its economy, Hirsch and Leitch (1996) reviewed the impact on Montana's economy. The direct economic impact on wildlife-associated issues in Montana is more the $1.2 million each year, mostly affecting retail trades and business and personal services (Hirsch and Leitch 1996).

Commercial livestock grazing (primarily cattle) also occurs on the S-CNF and surrounding federal lands. Grazing represents a $600 million industry in Idaho. No studies have described the economic impact of noxious weeds on Idaho's rangeland industries; however, Hirsch and Leitch (1996) estimate a loss of $10.73 per rangeland acre to noxious weed invasion in Montana.

Indirect impact may occur through reduced activity in the recreational and commercial use sectors. The anticipated annual economic impact from weed infestations in Montana is more than $2.6 million (Hirsch and Leitch 1996). This loss comes primarily from lost retail trade ($1.3 million), household ($567,000), and business and personal services ($326,000).

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy on the S-CNF, including weed prevention and BMPs outlined in Appendix A, plus the BMPs and mitigation measures described in *Chapter 2, Alternatives*. Numerous examples of these measures that would be implemented under the No Action Alternative were described in previous discussions of other resources on the S-CNF.

Cumulative Effects. Without a comprehensive weed control strategy on the S-CNF, the cumulative effects of most weed control efforts on the S-CNF together with treatments on the three CWMAs would be minimally successful. As weed infestations become larger on and adjacent to the S-CNF, the cost of control would increase, while the chance of long-term success would diminish. New invaders not successfully treated would likely become established in the ecosystem and, once established, would be difficult to eradicate. As a result, commercial and recreational opportunities within and adjacent to the S-CNF would diminish cumulatively as areas become potentially infested with weed populations. Weed treatment activities, along with other forest activities such as livestock grazing and timber harvest, could further hamper the effectiveness and enjoyment of commercial and recreational uses.

Additionally, opportunities for cooperative efforts with state and county agencies could occur but would be limited. Weed infestations on the S-CNF that were not successfully treated would spread to adjacent lands under other ownership, compromising weed control efforts on those lands. This cumulative effect would compromise the efforts of the CWMAs and exasperate their ability to control infestations on adjacent lands.

It is difficult to assess the negative economic and environmental costs of these cumulative effects on S-CNF resources, or to assign the loss described above to any specific commercial or recreational sector. Rather, these cumulative effects illustrate the profound impact less aggressive weed control activities would have in the future.

2) Proposed Action

Direct and Indirect Effects. The use of herbicides and mechanical, biological, livestock grazing, and combinations of these methods would not result in the total elimination of

noxious weeds from the S-CNF. However, the Proposed Action would strive to eradicate several weed populations, and would effectively reduce the size and rate of spread of other infestations. Sites already dominated by invasive and noxious weeds would not be expected to return to domination under the Proposed Action. In addition, the Proposed Action would likely hinder new noxious weed species from invading a treated site by strengthening native plant populations through natural or artificial restoration efforts, where appropriate.

The full spectrum of weed control actions that would be implemented under the Proposed Action should prevent expansion of weed populations on the S-CNF. Based on the conservative loss estimate described for the No Action Alternative, the Proposed Action would likely result in an impact savings of approximately $262,964. There is a chance that losses from the existing weed population could be recovered, thus increasing the savings.

Commercial and recreational activities on the S-CNF may be affected as access to infested areas is restricted during spraying and other weed treatments. For example, once users become aware that spraying activities will occur, recreational users may be unwilling to use that area. Commercial activities like livestock grazing or hunting may also experience a short-term decline in areas where spraying has occurred. Commercial and recreational use of roads within infested areas may need to be temporarily curtailed as mechanical and herbicide treatments occur. Limited displacement in campgrounds and at trailheads may occur during weed control activities. Weed control efforts like livestock grazing, herbicide application, and other combinations may affect the recreational experience for some users.

BMPs and Mitigation Measures. The BMPs and mitigation efforts described in *Section 2.D.3, Management Practices and Mitigation Measures,* would ensure that herbicides are applied safely and in accordance with EPA regulations. No aerial applications would occur near campgrounds or residences. Weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders.

Cumulative Effects. The larger expected cumulative beneficial effect of the Proposed Action, combined with the three CWMA treatment programs, is that weed-infested sites on the S-CNF would return to full recreational and commercial use while cooperative weed control efforts with state and county agencies would be enhanced. Weed treatment activities, along with other forest activities such as livestock grazing and timber harvest, could further hamper the effectiveness and enjoyment of commercial and recreational uses.

3) Alternative 1

Direct and Indirect Effects. This alternative would not incorporate aerial spraying activities. As a result, large weed infestations within the S-CNF would be more difficult to control and eradicate. This could lead to unchecked expansion of weed infestations throughout the S-CNF and additional loss of wildland acres. This would also adversely affect recreational and commercial uses on the S-CNF since weed control activities would take longer and be less effective in weed-infested areas.

However, this alternative incorporates the full array of weed treatment options (except for aerial herbicide application) discussed in *Chapter 2, Alternatives*. Implementation of this alternative would result in a short-term loss of some commercial and recreational opportunities as the ground application of herbicides and other methods are used. As the

treatments begin to have some effect, recreational and commercial use opportunities would likely return to pre-treatment levels.

The use of ground-based herbicides and mechanical, livestock grazing, and biological methods would not result in the total elimination of noxious weeds from the S-CNF. While this alternative may not effectively eradicate or control large weed infestations on steep slopes or inaccessible areas, it could be effective in smaller, fragmented patches of weeds. This alternative would eradicate several small weed populations, and would effectively reduce the size and rate of spread of other infestations on the S-CNF. Sites already dominated by invasive and noxious weeds may not return to domination under Alternative 1. In addition, it would likely hinder new noxious weed species from invading a treated site by strengthening native plant populations through natural or artificial restoration efforts where appropriate.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for aerial herbicide application) described for the Proposed Action. Weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders.

Cumulative Effects. Cumulative effects associated with Alternative 1 and the three CWMAs would be similar to those described for the Proposed Action. However, it would take longer to realize benefits to commercial and recreational uses on the S-CNF, while cooperative weed management efforts and objectives may be compromised if larger weed infestations expand beyond S-CNF boundaries. Weed treatment activities, along with other forest activities such as livestock grazing and timber harvest, could further hamper the effectiveness and enjoyment of commercial and recreational uses.

4) Alternative 2

Direct and Indirect Effects. While Alternative 2 offers a full array of non-chemical weed treatment options, it is expected that treatment would take longer and be less effective than under the Proposed Action, Alternative 1, or the No Action Alternative because it does not include the use of herbicides. The sole use of mechanical, livestock grazing, and biological methods and their combinations would not result in the total elimination of noxious weeds from the S-CNF. This alternative would control some small weed populations, and could effectively reduce the size and rate of spread of other small infestations. However, sites already dominated by invasive and noxious weeds would likely remain dominated by weeds under this alternative. Weed infestations located throughout the S-CNF, and particularly large infestations on the northern portion of the S-CNF, would be virtually impossible and unrealistic to control and eradicate. This would lead to further expansion of weed infestations and additional loss of wildland acres. Commercial and recreational opportunities would also be adversely affected, since weed infestations would remain, and expand, as non-chemical treatments are implemented.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for herbicide application) described for the Proposed Action, and discussed in *Section 2.D.3, Management Practices and Mitigation Measures*. Examples of these measures are presented in previous discussions of other resources on the S-CNF.

Cumulative Effects. Cumulative impacts on land uses of Alternative 2 combined with the three CWMA treatment programs and with other ongoing activities on the S-CNF would be similar in nature but would result in fewer beneficial effects and more adverse effects than anticipated under the Proposed Action, Alternative 1, or the No Action Alternative. The greatly increased use of mechanical weed treatments and associated extensive soil disturbance under Alternative 2 also would contribute to some cumulative adverse effects on land uses when combined with other activities occurring on the S-CNF. Implementation of Alternative 2 would not be expected to result in a successful long-term weed treatment program, effective or successful CWMA objectives, or a full range of land uses on weed-infested areas of the S-CNF.

b. Areas Proposed for Wilderness, Research Natural Areas, and Roadless Areas

1) No Action Alternative

Direct and Indirect Effects. Under the No Action Alternative, current management techniques would continue. Proposed wilderness areas, RNAs, and roadless areas would not be significantly affected by weed infestations. This alternative would likely continue to control infestations in and around these areas with some success. As noted in *Chapter 1, Purpose and Need,* weed invasions continue to spread, despite control and eradication efforts on the S-CNF. Without more aggressive control techniques, a direct effect would be increased vulnerability to expanding noxious weed invasions from infested areas. Such vulnerability is already apparent in the North Fork Ranger District, where infestations have begun to spread into roadless areas. Indirect effects would include loss of habitat, and loss of the rare or unique vegetation features and native biodiversity for which these areas were designated. Effects on these designated resource areas from treatment actions include short-term surface disturbances from mechanical treatments until native vegetation becomes re-established, and limited or temporary restrictions on access to these areas while treatment is occurring and perhaps until shortly after treatment has been completed.

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy, including weed prevention and BMPs outlined in Appendix A, plus the BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures.*

Cumulative Effects. Little or no cumulative effects on areas proposed for wilderness, RNAs, or roadless areas would be expected from implementing the No Action Alternative. CWMA activities are generally very limited in these areas as are the other S-CNF activities previously addressed as contributing to cumulative effects.

2) Proposed Action

Direct and Indirect Effects. The Proposed Action would eradicate several weed populations in and around proposed wilderness, RNAs, and roadless areas, and would effectively reduce the size and rate of spread of other infestations. Because of their remote locations, these areas are not normally susceptible to noxious weed invasions. However, some weed infestations occur in RNAs and adjacent to roadless areas, and these populations would be controlled, reduced in size, or possibly eradicated under the Proposed Action. Examples of potentially affected resources include 135,378 acres of roadless areas and the 1,739-acre Allan Mountain RNA in the North Fork HUC 5 of the North Fork Ranger District, which has

extensive spotted knapweed infestations. Detailed information on the location and size of roadless areas and RNAs on the S-CNF is presented in Appendix I. As a result of the Proposed Action implementation, biodiversity and other unique characteristics such as the pristine nature of these and other sensitive areas on the S-CNF would be preserved. Other direct effects of the Proposed Action on these areas could include potential drift from aerial and ground applications of herbicide, and trampling of valuable areas during mechanical treatments in and around an infestation in the RNA or roadless area.

BMPs and Mitigation Measures. The BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures,* would ensure that herbicides are applied safely and in accordance with EPA regulations. Any aerial treatment areas would be assessed for sensitive plants. Drift-related mitigation measures specific to aerial application would be implemented (e.g., buffer zones, drift reduction techniques, and wind restrictions). Weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders. In addition, the Proposed Action, as well as Alternatives 1 and 2, incorporate use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives* and referenced in previous resource discussions. These management tools are designed to consider site-specific conditions that result in the selection of a treatment method that achieves weed management goals with the least impact to the unique resources associated with the designated RNAs.

Cumulative Effects. No beneficial or adverse cumulative impacts on areas proposed for wilderness, RNAs, or roadless areas would be expected from the combined effects of implementing the Proposed Action, other ongoing activities on the S-CNF, and CWMA weed treatments on lands adjacent to the S-CNF, since these activities are minor occurrences in these areas.

3) Alternative 1

Direct and Indirect Effects. This alternative would not incorporate aerial spraying activities. As a result, large weed infestations on steep, inaccessible areas most common on the northern part of the S-CNF would be more difficult to control and eradicate. This could lead to expansion of knapweed infestations into roadless areas and RNAs in the North Fork Ranger District and other Ranger Districts, threatening the unique ecological characteristics of the RNAs and altering additional wildland acres associated with roadless areas (see Appendix I for details on resource locations). Other direct effects could mirror those described for the Proposed Action, although the potential risk from aerially applied herbicide drift into these areas would be removed.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for aerial herbicide application), as well as use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy, that were described for the Proposed Action.

Cumulative Effects. No beneficial or adverse cumulative impacts on areas proposed for wilderness, RNAs, or roadless areas would be expected from the combined effects of implementing Alternative 1, other ongoing activities on the S-CNF, and CWMA weed

treatments on lands adjacent to the S-CNF, since these activities are minor occurrences in these areas.

4) Alternative 2

Direct and Indirect Effects. While this alternative offers a full array of non-chemical treatment options, it is anticipated that weed treatment would take longer and be considerably less effective than under the Proposed Action, Alternative 1, or the No Action Alternative. As a result, roadless areas and the unique characteristics of the designated RNAs in the vicinity of weed infestations would be significantly affected by this alternative, since invasions of noxious weeds would continue and existing infestations would expand. Large weed infestations dominating the northern part of the S-CNF would be especially difficult to control or contain in the short term under Alternative 2. It is possible that biological methods would have an effect in containing and controlling weeds, but it may take several decades to achieve management goals. This would lead to expansion of knapweed infestations and continued loss of wildland acres within the roadless areas, along with further alteration of the unique vegetative characteristics of the RNAs in the northern reaches of the S-CNF.

This alternative would not incorporate any herbicide treatments, thus eliminating the potential risk of drift and other possible chemical-related effects on the characteristics of these unique areas. However, the extensive use of mechanical treatments under Alternative 2 and resultant surface disturbances and intrusions into pristine areas to reduce the size and rate of spread of smaller weed infestations may adversely affect the unique characteristics of RNAs and roadless areas.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for herbicide application), as well as use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy, that were described for the Proposed Action and Alternative 1.

Cumulative Effects. No beneficial or adverse cumulative impacts on areas proposed for wilderness, RNAs, or roadless areas would be expected from the combined effects of implementing Alternative 2, other ongoing activities on the S-CNF, and CWMA weed treatments on lands adjacent to the S-CNF, since these activities are minor occurrences in these areas.

c. Wild and Scenic Rivers

1) No Action Alternative

Direct and Indirect Effects. Under the No Action Alternative, invasive weeds would continue to affect commercial and recreational values on the S-CNF and in the communities that rely on and support healthy, wild, and scenic rivers. Stream segments that have been designated as Wild and Scenic, or are eligible for further consideration for Wild and Scenic River designation, would be directly affected by the continuation of current weed management strategies and the presence of noxious weeds under the No Action Alternative. These stream segments are discussed in *Section 3.D.4.d, Wild and Scenic Rivers,* and designated Wild and Scenic River segments are listed in Appendix I. Some eligible segments, like the Yankee Fork and Panther Creek, have served as important transportation and recreation corridors, and have been altered by streamside roads, and by recreational

and commercial activities such as mining, outfitting, camping, and other activities. Under the No Action Alternative, these streams would be susceptible to the continued invasion of noxious weeds, whose introductions are often associated with recreational and commercial activities. Invasive, exotic plants reduce, displace, and/or eliminate native vegetation, which can directly affect wildlife populations, aesthetic qualities, aquatic resources, other ecosystem attributes, and ecosystem function within these river corridors that are characteristics which contribute to their designation or their eligibility for outstandingly remarkable consideration as Wild and Scenic. Other effects on designated or eligible Wild and Scenic River segments from the continued presence of weeds would include loss of habitat, and loss of the outstandingly remarkable features and native biodiversity for which these areas were designated or are eligible for further consideration for designation. Within these areas, it would be desirable to convert the non-native plant populations back to native plant communities, but along some stream segments, weed infestations have become so well established that this would be impossible without more extensive and aggressive weed control efforts than planned under the No Action Alternative. Impacts also may occur through reduced activity in the recreational and commercial use sectors. Economic impact can result from changes in expenditures that affect suppliers of recreational goods and services. As an example, the anticipated annual economic impact from weed infestations in Montana is more than $2.6 million (Hirsch and Leitch 1996). This loss comes primarily from lost retail trade ($1.3 million), household ($567,000), and business and personal service ($326,000).

In addition to these effects, implementation of weed treatments, especially mechanical and chemiçal treatments, near or adjacent to designated or eligible river segments may adversely impact recreational use or enjoyment of the rivers, either by temporarily limiting access or by temporarily reducing an area's overall qualities. For example, increased water turbidity and reduced river aesthetics may result from runoff over areas disturbed by mechanical treatments and over barren areas prior to their revegetation.

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy, including weed prevention, BMPs, and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures*. Numerous examples of these measures that would be implemented under the No Action Alternative were described in previous discussions of other resources on the S-CNF.

Cumulative Effects. No beneficial or adverse cumulative impacts on stream segments designated or eligible for further consideration as Wild and Scenic would be expected from the combined effects of implementing the No Action Alternative and CWMA treatments on lands adjacent to the S-CNF. However, some cumulative effects may result from other ongoing activities on the S-CNF where there is a potential to introduce weeds and infest a native plant community. Such an occurrence may be difficult to control, contain, or eradicate given the somewhat limited acres of weeds planned for treatment under the No Action Alternative each year. Several examples discussed above where cumulative effects such as these may occur are the Yankee Fork and Panther Creek, which have served as important transportation and recreation corridors, and have been altered by streamside roads and a variety of recreational and commercial activities (mining, outfitting, camping, etc.). Under these conditions and in other drainages with similar conditions or that receive heavy recreational use, safeguarding the value of a Wild And Scenic River designation or a

segment eligible for designation may eventually be compromised under the No Action Alternative weed treatment program.

2) Proposed Action

Direct and Indirect Effects. The Proposed Action would provide far more benefits to, and far fewer adverse effects on, designated and eligible Wild and Scenic River segments than the No Action Alternative because of the more intensive weed treatment program. The Proposed Action would eradicate several weed populations in eligible Wild and Scenic River segments, and would effectively reduce the size and rate of spread of other infestations. The alternative would also result in a corresponding savings in wildland acreage and contribute to maintaining the overall outstandingly remarkable characteristics of the river corridors that led to their designation or their eligibility for designation as Wild and Scenic. The Proposed Action would also have a greater flexibility than the No Action Alternative for treating new weed infestations associated with other recreational activities on the S-CNF.

Adverse effects from weed treatment would be similar to those described for the No Action Alternative and may temporarily include limitations on use or access along portions of river corridors during treatment activities. Additionally, runoff or drift from herbicide applications and increased sedimentation and river water turbidity from mechanical activities may have direct but very short-term effects on portions of eligible corridors.

BMPs and Mitigation Measures. All of the BMPs and mitigation measures described for the No Action Alternative would be implemented under the Proposed Action. In addition, BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures* for the Proposed Action would ensure that herbicides are applied safely and in accordance with EPA regulations. Any aerial treatment areas would be assessed for sensitive resources, as described in *Chapter 2, Alternatives*. Drift-related mitigation measures specific to aerial application would be implemented (e.g., buffer zones, drift reduction techniques, wind restrictions). Weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders. The project operation plan would be the source for specific controlled livestock grazing use objectives and stipulations should this particular treatment option be considered. The Proposed Action also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives*. These management tools are designed to consider site-specific conditions that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources, including designated and eligible Wild and Scenic River corridors.

Cumulative Effects. The potential for adverse cumulative impacts on designated or eligible Wild and Scenic River corridors under the Proposed Action would be less than that described for the No Action Alternative. The more aggressive and extensive nature of weed treatments that would occur under the Proposed Action would provide more flexibility in being able to treat new weed infestations associated with other ongoing activities on the S-CNF, such as recreational uses, that may otherwise become established. There would be little or no cumulative effects from activities associated with the three CWMAs as these would be very limited or non-existent within Wild and Scenic River areas.

3) Alternative 1

Direct and Indirect Effects. This alternative would provide benefits similar to those described for the Proposed Action, but they would take longer to achieve and be somewhat less effective or widespread because of the absence of aerial herbicide application under this alternative. Most river corridors that are eligible for further considerations as Wild and Scenic (such as the Yankee Fork and Panther Creek) would not be affected by this variation since they already have roads and access for the ground application of herbicides. Other, steeper corridors have smaller weed infestations that may be adequately controlled by ground-based herbicide application and combinations of treatments. However, where large infestations are located on steep, inaccessible hillsides, weed eradication and control may take longer and be less effective than the Proposed Action, increasing the risk of adverse effects to the outstandingly remarkable eligibility characteristics.

Adverse effects resulting from mechanical, controlled livestock grazing, and chemical treatment would be similar to those described for the Proposed Action, although the potential risk for herbicide drift into sensitive areas from aerial applications would be removed.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for aerial herbicide application), as well as use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy, that were described for the Proposed Action.

Cumulative Effects. The cumulative effects under this alternative would be similar to those described for the Proposed Action.

4) Alternative 2

Direct and Indirect Effects. While this alternative offers a full array of non-chemical treatment options, it is anticipated that weed treatment would take longer and be considerably less effective than under the Proposed Action, Alternative 1, or the No Action Alternative. As a result, designated and eligible Wild and Scenic River corridors in the vicinity of weed infestations would be significantly affected by this alternative, since invasions of noxious weeds would continue and existing infestations would expand, putting these outstandingly remarkable characteristics at risk. Large weed infestations dominating the northern part of the S-CNF would be impossible to control or contain in the short term under Alternative 2. This is especially important since Appendix I shows that the bulk of river corridors (over 12,000 acres) designated as Wild and Scenic on the S-CNF occur in the North Fork Ranger District where spotted knapweed infestations are extensive. It is possible that biological methods would have an effect in containing and controlling weeds, but it would likely take several decades to achieve management goals. This would lead to expansion of knapweed infestations in these areas and additional impacts on designated Wild and Scenic Rivers and on the outstandingly remarkable characteristics identified on those stream segments eligible for further study as Wild and Scenic.

This alternative would not incorporate any herbicide treatments, thus eliminating the potential risk of drift and other possible chemical-related effects on the characteristics of these unique areas. However, the extensive use of mechanical treatments under Alternative 2 and resultant surface disturbances, erosion, and potentially increased

sedimentation and river water turbidity may adversely affect the characteristics of designated and eligible Wild and Scenic Rivers and their corridors.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for herbicide application) described for the Proposed Action, and discussed in *Section 2.D.3, Management Practices and Mitigation Measures*. It also includes use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy, the same as noted for the Proposed Action.

Cumulative Effects. Cumulative effects under Alternative 2 would be similar to those described for the No Action Alternative. However, they would include increased limitations in the flexibility to control, contain, or eradicate potential new infestations of noxious weeds introduced through other ongoing activities, such as various recreational and commercial uses, that occur on the S-CNF. There would be little or no cumulative effects from activities associated with the three CWMAs as these would be very limited or non-existent within Wild and Scenic River areas.

4.C.5. Visual Resources

a. No Action Alternative

Direct and Indirect Effects. Under the No Action Alternative, current weed management techniques would continue. As noted in previous discussions in this document, weed invasions continue to spread, despite control and eradication efforts on the S-CNF. Without more aggressive control techniques, a direct effect would be increased vulnerability of S-CNF resources to expanding noxious weed invasions from infested areas.

For visual resources, noxious weed populations primarily affect views of the immediate foreground and middle ground, rather than the background, except where plant infestations are large enough to impact views of hillsides. Direct effects on visual resources can be both positive and negative. Negative effects of weeds are largely limited to the foreground, where weeds are out of scale, visually out of place, and often associated with land disturbances such as timber harvesting activities and livestock grazing. At the same time, to those unaware that they are looking at noxious weeds, flowering knapweed and other weeds may be an appealing component of the landscape. As a result, it is difficult to quantify the effects of the No Action Alternative on visual resources. However, the No Action Alternative would have a direct effect on the opportunity to view native vegetation and wildlife through the continuing loss of wildland acres. An indirect effect associated with this loss is that the visual appeal native plant populations offer would be reduced. As native plant populations decrease, opportunities for viewing wildlife that rely on these plants would also diminish.

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy, including BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures*. Numerous examples were provided in previous resource discussions in this chapter.

Cumulative Effects. There may be some minor cumulative impacts on visual resources under the No Action Alternative if other ongoing S-CNF activities or occurrences (for example, wild fire, road- or trail-related erosion), together with the presence of weeds on the

S-CNF, adversely affect views of the S-CNF. The potential for limited weed treatment success on adjacent lands that are treated under the three CWMAs because of limited success on the S-CNF under the No Action Alternative may result in localized minor cumulative impacts on visual resources at the S-CNF boundary.

b. Proposed Action

Direct and Indirect Effects. The Proposed Action would offer a more fully integrated approach to weed management than any of the other alternatives while maintaining or enhancing visual resources objectives. The long-term expected effect of the success of the Proposed Action is that any weed-infested sites would return to their original state. As native plant populations recover, the natural appearing landscapes would return, and enhanced wildlife on the S-CNF would increase opportunities for viewing natural habitat and wildlife.

The Proposed Action would directly affect the potential visual impact of the anticipated increasing weed populations along roads and hillsides. It would eradicate several weed populations, and would effectively reduce the size and rate of spread of other infestations. Visual quality in treated areas on the S-CNF would improve. During treatment, however, visual opportunities may be temporarily diminished as weed populations die, soil surfaces are exposed and disturbed, and natural vegetation is restored and recovers. This effect is expected to be short-lived, and would be most apparent where there are large weed infestations. Other effects of the Proposed Action on visual resources could include potential trampling of treatment areas during mechanical and livestock grazing treatments in and around an infestation.

BMPs and Mitigation Measures. All BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures* and discussed in previous sections of this document would be implemented under the Proposed Action to avoid or minimize impacts on S-CNF visual resources. The Proposed Action also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy that achieves weed management goals with the least impact on S-CNF resources, including visual quality.

Cumulative Effects. No cumulative impacts on S-CNF visual resources would be expected from the combined effects of implementing the Proposed Action, other ongoing activities or occurrences on the S-CNF, and CWMA weed treatments on lands adjacent to the S-CNF. The more aggressive and extensive nature of weed treatments that would occur under the Proposed Action would provide more flexibility in being able to treat weed infestations and prevent or minimize the potential occurrence of cumulative impacts on visual resources.

c. Alternative 1

Direct and Indirect Effects. This alternative would not incorporate aerial spraying activities. As a result, large weed infestations in steep, inaccessible areas would be more difficult and somewhat less effective to control and eradicate. This could lead to expansion of spotted knapweed infestations throughout the S-CNF, and some additional loss of additional wildland acres.

The resulting direct visual impact associated with Alternative 1 would be most apparent where large infestations of weeds occur on steep slopes most prevalent in the northern Ranger Districts of the S-CNF. Ground application of herbicides may have some long-term effects on weed infestations, but control and eradication goals may not be met where access to remote, rugged areas of the S-CNF is often difficult at best. As a result, the vistas of these steep, widely visible slopes would be marred by weed infestations indefinitely. Smaller, more accessible weed populations would be effectively treated, and Alternative 1 would result in control of most populations and eradication of smaller populations. Other direct effects would be the same as described for the Proposed Action; some visual opportunities would be marred during treatment as weeds die, soil surfaces are exposed and disturbed, and native plant populations recover.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for aerial herbicide application) that were described for the Proposed Action and discussed in previous sections of this document.

Cumulative Effects. There may be some potential for cumulative impacts on visual resources under Alternative 1 when combined with the potential effects of other ongoing S-CNF activities and treatment effects under the CWMAs. The nature of the cumulative effect would be similar to that described for the No Action Alternative.

d. Alternative 2

Direct and Indirect Effects. This alternative does not include any herbicide treatment. It is therefore anticipated that weed treatment would take longer and be less effective than under the Proposed Action, Alternative 1, or the No Action Alternative. Large weed infestations on the steep inaccessible areas most prevalent in the northern part of the S-CNF would be impossible to control and contain in the short term. This could lead to expansion of knapweed infestations in these Ranger Districts, and some additional loss of opportunities for viewing the natural landscape. Other large weed infestations could also expand, at least in the short term, since many weed types do not immediately and may never effectively respond to non-chemical treatment.

BMPs and Mitigation Measures. This alternative incorporates all BMPs and mitigation measures (except for herbicide application) described for the Proposed Action, and discussed in *Section 2.D.3, Management Practices and Mitigation Measures*. Like the Proposed Action and Alternative 1, this alternative also includes use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy to minimize impacts on visual resources while achieving weed treatment objectives on the S-CNF.

Cumulative Effects. Potential cumulative impacts on visual resources under Alternative 2 would generally be similar to those described for the No Action Alternative, however, the cumulative effectiveness and weed treatments with the CWMA program would be reduced.

4.C.6. Air Quality and Noise

a. Air Quality

1) No Action Alternative

Direct and Indirect Effects. Under the No Action Alternative, existing weed management treatment techniques would continue, including current levels of herbicide application. An effect on air quality would be potential drift from herbicide spraying onto non-target areas. Spot spraying would result in little drift as applications are made close to the ground's surface. The odor of the chemicals may persist at spray sites for several hours following current ground-based application strategies. Other direct effects on air quality would include dust from spray vehicles and mechanical weed control efforts. Indirect effects on air quality from successful weed treatment would include localized reductions in airborne pollen from weeds and allergens at certain times of the year. However, because the No Action Alternative would continue weed eradication and control efforts at their present level, it is anticipated that pollen levels across the S-CNF would remain at about current levels or increase under this alternative. None of the herbicides approved for use in wildland weed control produce significant airborne by-products. Indirect effects from these activities would be minimal because of the application of BMPs and mitigation measures described in the following text.

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy, including the use of BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures*. Because herbicide preparation, use, and application rates would comply with label instructions and Forest Service requirements, there would be no adverse effects on air quality. Examples of protective BMPs and mitigation measures include compliance with all State and Federal laws and agency guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; no spraying of herbicides when wind velocity exceeds 10 mph; and BMPs and mitigation measures described in the preceding resource discussions in this chapter regarding accidental spills of herbicides, wind drift during herbicide application, and the availability of weed treatment information at District offices. Additional examples of protective BMPs and mitigation measures are presented in *Section 4.D.1, Human Health and Safety*, of this chapter.

Cumulative Effects. Potential cumulative effects on air quality under the No Action Alternative include possible localized increases in dust from mechanical weed treatment and herbicide spray vehicles' activities and from other nearby ongoing S-CNF activities, such as use of roads and trails. Similar cumulative effects may result from nearby weed treatments on adjacent lands under the three CWMAs. Also, some localized odors from herbicide use may persist for several hours if S-CNF and CWMA treatments occur at the same time and in proximity to one another. Since the effects of herbicide application are short term, they will not have cumulative carry-over effects from year to year on air quality.

2) Proposed Action

Direct and Indirect Effects. A potential short-term direct effect on air quality under the Proposed Action would stem from herbicide drift to non-target areas during aerial spraying. Ground-based herbicide application would result in little drift as applications are made

close to the ground's surface. In either case, the odor of the chemicals may persist at spray sites for several hours following ground-based or aerial application. Other direct effects would include increased dust and pollen from vehicles or mechanical treatments.

Short-term mechanical treatments could also include burning weeds with a propane torch. This may lead to a small increase in smoke or haze in the immediate vicinity of the treatment area. None of the herbicides currently registered for wildland weed control are known to produce airborne by-products from burning treated vegetation in amounts that affect air quality. However, spot burning of vegetation treated with chemicals would not be planned within the same season that chemicals are applied. Mechanical treatment of this kind would only be used on small, isolated infestations of weeds, while chemicals would generally be applied on larger, more mature, infestations.

Since the Proposed Action would provide for the greatest level of weed control compared to the other alternatives it would result in the greatest reduction in airborne weed pollen and allergens in the affected area in the long term.

BMPs and Mitigation Measures. The BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures*, would ensure that herbicides are applied safely and in accordance with EPA regulations. All of the BMPs and mitigation measures previously described for the No Action Alternative and referenced in other sections of this chapter would be implemented under the Proposed Action. Drift-related mitigation measures specific to aerial herbicide application also would be implemented under the Proposed Action (e.g., wider buffer zones than for ground-based herbicide application, no aerial spraying within 300 feet of developed campgrounds or residences, drift reduction techniques, and wind velocity and directional restrictions during aerial application). In addition, weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders. The Proposed Action also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy to minimize the potential for air quality impacts while achieving weed treatment objectives.

Cumulative Effects. Cumulative effects on air quality under the Proposed Action from other ongoing S-CNF activities and CWMA treatment activities would be similar to those described for the No Action Alternative. Application of chemical herbicides on adjacent ownerships combined with S-CNF applications would result in the same, short-term effects on air quality caused by chemical odor. This effect may combine to cover a more extensive area if application occurs on adjacent lands at similar times. Since these effects are short term, they would not have carry-over effects from year to year relative to air quality.

3) Alternative 1

Direct and Indirect Effects. The direct effects on air quality of Alternative 1 would be virtually identical to those of the Proposed Action, although the short-term risk of drift from aerial spraying would be removed. However, without aerial spraying, large weed infestations on steep inaccessible slopes would be more difficult and less effective to control and eradicate. This could lead to short-term expansion of spotted knapweed infestations, especially on northern portions of the S-CNF. As a result, airborne weed pollen and allergens would probably increase in those areas.

Smaller, more accessible weed infestations would be effectively treated, and Alternative 1 would result in the control of most weed populations and the eradication of smaller populations, although not as quickly as under the Proposed Action. As a result, localized reductions in levels of airborne weed pollen and allergens would be expected. Other direct effects would be the same as described for the Proposed Action.

BMPs and Mitigation Measures. This alternative includes all BMPs and mitigation measures (except for aerial herbicide application), as well as components of the site-specific implementation process that were described for the Proposed Action.

Cumulative Effects. Cumulative effects on air quality under Alternative 1 would generally be similar to those described for the Proposed Action although there would be a reduced potential for widespread effects when combined with CWMA activities because of no aerial herbicide applications.

4) Alternative 2

Direct and Indirect Effects. Short-term effects on air quality from herbicide application would not occur as no chemical applications would be used under this alternative. However, the more extensive use of mechanical treatments that would occur under Alternative 2 may result in localized increases in dust levels and temporary but repeated instances of air quality degradation. Because it would take longer to achieve a lesser level of weed control or containment under Alternative 2 than the other alternatives temporarily increased dust levels from mechanical treatments at least in localized areas would likely extend over an indefinite period of time. Beneficial effects of reduced weed pollen and allergens on any particular site would occur if weeds are reduced on that site. Individually, these effects may be too small to substantially benefit local air quality.

BMPs and Mitigation Measures. This alternative includes all BMPs and mitigation measures (except for herbicide application) described for the Proposed Action, and discussed in Section 2.D.3, Management Practices and Mitigation Measures. It also includes all components of the site-specific implementation process described for the Proposed Action.

Cumulative Effects. Cumulative effects under this alternative would be similar to those described for the Proposed Action, with two exceptions. There would be a greater potential for cumulative air quality impacts due to increased dust levels but no potential for cumulative herbicide effects since chemicals would not be used under Alternative 2.

b. Noise

1) No Action Alternative

Direct and Indirect Effects. Under the No Action Alternative, existing weed management techniques would continue, including current levels of herbicide application. The only short-term direct effect on noise levels would be from localized mechanical treatments such as mowing and mulching.

BMPs and Mitigation Measures. The No Action Alternative would continue the current weed management strategy, including the BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures.*

Cumulative Effects. There may be localized, temporary cumulative effects on noise levels associated with the No Action Alternative because of increased noise levels from other ongoing activities on the S-CNF (for example, use of roads, trails, and other recreational activities) and possibly from increased noise levels from nearby mechanical weed treatments that may be occurring on adjacent lands under the three CWMAs.

2) Proposed Action

Direct and Indirect Effects. Short-term direct effects on noise levels under the Proposed Action would result from equipment used in aerial spraying of herbicides and from mechanical treatment efforts such as mowing and mulching. Indirect effects may occur if the frequency or quality of commercial and recreational experiences on the S-CNF are diminished because of increased noise levels during treatment activities.

BMPs and Mitigation Measures. The BMPs and mitigation measures described in *Section 2.D.3, Management Practices and Mitigation Measures*, would be implemented to ensure that noise levels are kept at a minimum during weed treatments. In addition, weed treatment information would be made available at District offices and information regarding treatment schedules would be made available through such means as notification to permit holders.

Cumulative Effects. Cumulative effects on noise under the Proposed Action would be similar to those described for the No Action Alternative, and generally localized to the area of weed infestation and other nearby activities and temporary in nature.

3) Alternative 1

Direct and Indirect Effects. Overhead noise from aerial herbicide applications would not occur under this alternative, thus decreasing the impact on noise levels from weed treatments. With this exception, the direct and indirect effects on noise levels under Alternative 1 would be virtually identical to those of the Proposed Action, and would be short term.

BMPs and Mitigation Measures. This alternative includes all BMPs and mitigation measures (except for aerial herbicide application) as well as the site-specific implementation process described for the Proposed Action.

Cumulative Effects. Cumulative effects on noise would be similar to those described for the No Action Alternative, but they would potentially occur in localized areas over a greater portion of the S-CNF because of larger acreages planned for annual treatment under Alternative 1.

4) Alternative 2

Direct and Indirect Effects. Mechanical weed treatments may cause short-term, direct effects on noise levels within the areas of weed treatment. The use of mechanical treatment methods and noise generated by this treatment technique would be greater under this alternative than any of the other alternatives because of the absence of chemicals as a treatment option. Indirect effects may also occur if some recreational and commercial experiences are affected by a short-term rise in noise levels.

BMPs and Mitigation Measures. This alternative includes all BMPs and mitigation measures (except for herbicide application) described for the Proposed Action, and discussed in *Section 2.D.3, Management Practices and Mitigation Measures.*

Cumulative Effects. Cumulative effects on noise would be similar to those described for Alternative 1, although localized and temporary increases in noise levels may be greater under Alternative 2 because of the more extensive use of mechanical treatments.

4.D. Human and Socioeconomic Resources

4.D.1. Human Health and Safety

a. No Action Alternative

Direct and Indirect Effects. Noxious and invasive non-native weeds are not known to have directly or indirectly affected human health and safety on the S-CNF, and they have not posed significant health threats to a large segment of the population. These same general conditions would be expected in the future, although the continued expansion of noxious weeds on the S-CNF under the No Action Alternative (as discussed in *Section 4.B.1, Vegetation Resources and Noxious Weeds)* may result in an increased potential for minor effects on human health and safety. Examples of potential effects on humans that can be caused by weed species present on the S-CNF, and unique characteristics of several of these species, were described in *Section 3.E.1, Human Health and Safety.* They include minor scrapes and skin irritations from Canada, musk, and other thistle species; sickness from ingesting large amounts of tansy ragwort and St. Johnswort; minor skin irritations from hand-pulling weeds without using gloves; a latex-bearing sap in leafy spurge that can irritate human skin and cause blindness in humans on contact with the eyes; the sap of Russian knapweed contains a known carcinogen; and the sap of spotted knapweed may contain a carcinogen (U.S. Forest Service 2000a; U.S. Forest Service 2001d; Callihan et al. [1991] in U.S. Forest Service 2001a; Niehoff [1997] in U.S. Forest Service 2001d). The potential for some of these effects to occur on the S-CNF would likely increase under the No Action Alternative compared to existing conditions because of expected increases in weed infestations. Increased weed infestations on the S-CNF also would increase the chance of fire within the wildland interface. The resultant degree of risk to human health and safety would depend directly on the successes and failures of the weed treatment program on the S-CNF and indirectly on the successes and failures of the three CWMA treatment programs on adjacent lands. An additional human health-related effect discussed for the No Action Alternative in *Section 4.C.6.a, Air Quality,* of this chapter is the potential for increased levels of airborne weed pollen and allergic reactions.

The ground-based application of herbicides and other weed treatments (biological controls and mechanical methods) on the S-CNF would continue under the No Action Alternative at the current treatment rate of approximately 3,000 to 3,500 acres per year. There have been no data to indicate that any of the weed treatment activities on the S-CNF, including herbicide application, have impacted public or worker health and safety and, therefore, they would not be expected to under the No Action Alternative. There have been no reported instances of herbicide impacts to workers on the S-CNF and no reports of worker health problems. This conclusion is supported by findings for weed management programs on other National

Forests in the Intermountain West that are discussed in detail under the Proposed Action. The Forest Service concluded that based on the best scientific information available and with the implementation of BMPs and mitigation measures, it would be reasonably expected that human health impacts from herbicide applications would range from insignificant and small to none (U.S. Forest Service 1999b; 2000b; 2001a; b; c). The use of biological controls and mechanical methods, as well as site restoration (where appropriate) following treatment, would not be expected to adversely affect human health and safety so long as all equipment used is operated safely and according to the manufacturer's directions. Small amounts of dust may be temporarily raised during some weed treatment/restoration activities, but any effects would be localized and minor.

Other possible effects on workers from treating weeds include cuts, scratches, and skin irritation during the treatment of weeds, as well as sprains and strains from bending or working on uneven ground. The use of boots, long-sleeved shirts, and gloves, as well as strict adherence to Forest Service safety policies, would minimize the risk of injuries or skin irritations to workers. Weed treatments would continue to be implemented according to all of the BMPs and mitigation measures described for the No Action Alternative in *Chapter 2, Alternatives* to avoid or minimize the potential for impacts on human health and safety. Many of these measures focus on the safe and proper application of herbicides, as described below.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the No Action Alternative are designed to avoid or minimize the potential for adverse effects on public health and safety and worker health and safety on the S-CNF. They focus on the proper ground-based application of herbicides and on weed prevention and management BMPs. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, and include 23 directives that specifically address precautionary, notification, and other safeguarding measures associated with the ground-based application of herbicides. Examples of some of these measures include the following:

- Apply all chemicals in accordance with EPA registration label requirements and restrictions and/or Forest Service policy, whichever is more restrictive.
- Fill out a Pesticide Application Record on a daily basis detailing the chemical application.
- Treatment areas will be identified on maps available at the Ranger District offices and the Public Lands Office in Salmon, Idaho. The herbicides used, dates of use, and name and phone number to contact for more information will also be available.
- Use a State or Federal licensed applicator to apply or directly supervise herbicide application.
- Follow restrictive location, application methodology, and wind velocity criteria to reduce wind drift potential and the potential for impacts on special concern areas.
- Follow procedures for mixing, loading, and disposing of herbicides (see Appendix B).

- Carry a Herbicide Emergency Spill Plan (see Appendix D) to reduce the risk and potential severity of an accidental spill.
- Carry containment equipment during herbicide application in case of a spill.
- Retain a copy of the material data safety sheets for each herbicide and train personnel on the location and understanding of this information.

Cumulative Effects. Potential cumulative effects include the combined effects of weed treatment under the No Action Alternative together with treatments under the three CWMAs. Expected increases in weed infestations on the S-CNF and possibly on adjacent non-National Forest lands may increase the likelihood on a cumulative basis that some of the adverse effects weed species can have on human health could occur under the No Action Alternative. The potential for such an occurrence may be greatest in the northern portion of the S-CNF and on immediately adjacent non-National Forest lands because of extensive spotted knapweed infestations. Also, the likelihood that weed treatments would continue over a number of years results in a cumulative increase in the possibility that a health-related effect would occur as a result of the actual treatment of weeds (for example, sprains, strains, skin irritations, allergies, cuts, etc.).

There also may be some minor, localized cumulative increases in dust as a result of soil disturbance and exposure during and following treatment prior to re-establishment of native vegetation. There would likely be no cumulative effects on the public or workers from the effects of other ongoing activities or future actions on the S-CNF that are unrelated to weed treatments, such as livestock grazing, roads and trails, and recreation.

b. Proposed Action

Direct and Indirect Effects. The potential for adverse effects on human health and safety caused by the occurrence of noxious weeds on the S-CNF would progressively decline under the Proposed Action compared to the No Action Alternative because of the expected decline in weed populations. Examples of these effects were described under the No Action Alternative. They included scrapes, scratches, cuts, skin irritations, allergies, and other relatively mild effects. The potential for fire within the wildland interface and risk to human health and safety also would be expected to decline as weed populations decline.

Weed treatment methods that would be used under the Proposed Action include mechanical, biological, controlled grazing, aerial and ground-based herbicide applications, and combinations of these treatments. The use of biological controls and controlled grazing would not be expected to adversely affect human health and safety, except possibly for sprains or strains to workers using these treatment methods in very steep or uneven terrain. Risks to workers from using mechanical methods during weed treatment/site restoration would be the same as described for the No Action Alternative, and include the possibility of cuts, scratches, sprains, and strains. The same precautionary measures would be followed while conducting work and operating machinery to ensure worker safety. Any effects from dust raised during weed treatment/site restoration activities would be localized, temporary, and minor.

The application of chemicals would be one of the primary weed treatment methods on the S-CNF under the Proposed Action.

Approximately 13,600 acres of weed infestations on the S-CNF would be treated under the Proposed Action each year using a combination, or one or the other, of aerial and ground-based herbicide applications. Herbicides also would be used in combination with mechanical, biological, and controlled livestock grazing treatments to treat an additional 1,400 acres of noxious weeds on the S-CNF each year. Aerial herbicide application would be the most effective and aggressive treatment method for quickly accessing and treating large weed-infested areas and smaller, isolated areas, but this is often a concern to the public from a human health and safety perspective.

Numerous Forest Service NEPA documents recently prepared for weed management programs on other National Forests in the Intermountain West have addressed this concern by examining the potential direct, indirect, and cumulative effects of various herbicides on human health and safety. Herbicide applications evaluated in those documents include ground-based as well as aerial applications. The Forest Service concluded that based on the best scientific information available and with the implementation of BMPs and mitigation measures, it would be reasonably expected that human health impacts from herbicide applications would range from insignificant and small to none (U.S. Forest Service 2001b; c; d; 1999a; 2000a). Findings presented in those documents that are applicable to the S-CNF are referenced in this Final EIS.

There is a wide variety of opinions within the general population on the value and safety of pesticides, including the herbicides proposed for use on the S-CNF. Many people, especially in rural and agricultural areas, regard pesticides as a necessary part of their business and as a relatively safe tool, if used properly (U.S. Forest Service 2001d). The Northern Region of the Forest Service (Region 1) has analyzed the risk of the use of a number of the herbicides proposed for use on the S-CNF, including 2,4-D, picloram, clopyralid, dicamba, glyphosate, triclopyr, and metsulfuron methyl. This analysis is presented in the following two Risk Assessment documents: *Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites* (U.S. Forest Service 1992); and *Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region* (Monnig 1988). Additional studies or research referenced include *EPA Science Advisory Board Report: Assessment of Potential 2,4-D Carcinogenicity-3/91* (EPA 1994); *EPA Risk Assessment Guidelines of 1986-8/87* (EPA 1986); and *EPA RdD/Peer Report of Picloram-9/93* (EPA 1993). These documents are incorporated into this EIS by reference and are included in Forest Service files.

The Forest Service (2001d) discussed the considerable body of laboratory test data that are available on herbicides. Most of these tests have been conducted to meet requirements for EPA registration of these chemicals for use in the U. S. Current Federal regulations allow for conditional registration of herbicides pending the completion of all tests required for final registration as long as no unreasonable adverse effects are found in the interim. The Forest Service (2001d) also noted that this allowance for continued use before all testing of a herbicide is completed concerns some members of the public and has led to charges that "untested" herbicides are allowed on the market. To the contrary, all of the herbicides proposed in this Final EIS for use on the S-CNF are EPA-approved for use according to their label instructions, are conditionally registered, and have been assigned EPA registration numbers.

Appendix J provides information on the characteristics and properties of the herbicides proposed for use on the S-CNF, including their persistence and mobility in soil and water, degradation mechanisms, and toxicity levels to various animals. Information on toxicity levels and toxicity categories comes from results of tests the EPA requires for herbicide registration that must evaluate acute (short-term) and chronic (longer term) exposures of laboratory animals to chemicals. All of these herbicides have been subjected to long-term feeding studies that test for general systemic effects such as kidney and liver damage. In addition, tests on the effects on reproductive systems, mutagenicity (birth defects), carcinogenicity (cancer), and teratogenicity (malformations) have been conducted (U.S. Forest Service 2001d; 1999a).

Table 4-3 lists EPA toxicity categories (danger/poison, warning, caution, none) for various types of harmful acute reactions (oral, dermal, inhalation, eye irritation, and skin irritation). Table 4-4 compares human hazards based on these EPA acute toxicity categories for the herbicides proposed for use on the S-CNF. EPA toxicity categories for acute oral, acute dermal, acute inhalation, and primary skin irritation are rated as "caution" or "none" for all of the herbicides, except picloram ("danger/poison" for inhalation). Acute effects associated with primary eye irritation exceed "caution" levels for six of the herbicides listed in Table 4-4.

Table 4-5 compares the potential for harmful human carcinogenic, teratogenic, reproductive, and mutagenic chronic effects for the herbicides proposed for use on the S-CNF. Data presented in Table 4-5 show that for each of the four human health categories evaluated, the herbicides would either have "no effects" (not considered a hazard to humans) or "unlikely effects" (not considered a hazard to humans at expected exposure levels), with two exceptions. These exceptions are "unknown effects" regarding the carcinogenicity of 2,4-D and picloram, indicating that laboratory tests are inconclusive or further testing is required.

The herbicides identified in these tables also contain "inert" ingredients, including surfactants, that are not expected to have any significant effect. The dyes and other adjuvants described in Chapter 2 are described as having little effect on wildlife populations. Mitigation measures, buffer zones BMPs, and SOPs are expected to minimize adverse impacts, if any, of these other ingredients.

TABLE 4-3
EPA Toxicity Categories for Various Types of Harmful, Acute Reactions

Toxicity Category	Signal Word	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (mg/L)	Eye Irritation	Skin Irritation
I	DANGER Poison	0 – 50	0 – 200	0 – 0.2	Corrosive; corneal opacity not reversible within 7 days	Corrosive
II	WARNING	>50 – 500	>200 – 2000	>0.2 – 2.0	Corneal opacity reversible within 7 days; irritation persisting for 7 days	Severe irritation at 72 hours
III	CAUTION	>500 – 5,000	> 2000 – 20,000	>2.0 – 20	No corneal opacity; irritation reversible within 7 days	Moderate irritation at 72 hours
IV	NONE	>5,000	>20,000	>20	No irritation	Mild or slight irritation at 72 hours

Source: U.S. Forest Service 2001b.

TABLE 4-4
Human Hazards Based on Acute Toxicity Categories for Weed Control Herbicides on the S-CNF

Herbicide	Acute Oral Toxicity	Acute Dermal Toxicity	Acute Inhalation	Primary Eye Irritation	Primary Skin Irritation
2,4-D amine	Caution	Caution	Caution	Danger-Poison	Caution
Chlorsulfuron	None	Caution	Caution	Caution	None
Clopyralid	Caution	Caution	Caution	Warning	None
Corn Gluten Meal (WOW!®)	None	None	None	None	None
Dicamba	Caution	None	None	Danger-Poison	None
Fosamine	None	None	None	Caution	Caution
Glyphosate	None	None	Caution	Warning	None
Imazapic	None	None	None	Caution	Caution
Metsulfuron Methyl	None	Caution	Caution	Warning	Caution
Pelargonic Acid (Scythe®)	None	None	None	None	None
Picloram	Caution	Caution	Danger-Poison	Caution	None
Sulfometuron Methyl	None	Caution	Caution	None	None
Triclopyr	Caution	Caution	Caution	Caution/Danger	Caution

Sources: EXTOXNET 2002, EPA 2002, Bio-Weed® 2002, U.S. Forest Service 2001a, and U.S. DOE.

TABLE 4-5
Comparison of Harmful Chronic Effects of Herbicides Proposed for Controlling Weeds on the S-CNF

	Potential Chronic Effects			
Herbicide	Carcinogenic	Teratogenic	Reproductive	Mutagenic
2,4-D amine	Unknown	Unlikely	Unlikely	Unlikely
Chlorsulfuron	No Effects	No Effects	No Effects	No Effects
Clopyralid	No Effects	No Effects	No Effects	No Effects
Corn Gluten Meal (WOW!®)	No Effects	No Effects	No Effects	No Effects
Dicamba	No Effects	No Effects	Unlikely	No Effects
Fosamine	No Effects	No Effects	No Effects	No Effects
Glyphosate	No Effects	No Effects	Unlikely	No Effects

TABLE 4-5
Comparison of Harmful Chronic Effects of Herbicides Proposed for Controlling Weeds on the S-CNF

Herbicide	Potential Chronic Effects			
	Carcinogenic	Teratogenic	Reproductive	Mutagenic
Imazapic	No Effects	No Effects	No Effects	No Effects
Metsulfuron Methyl	No Effects	No Effects	No Effects	No Effects
Pelargonic Acid (Scythe®)	No Effects	No Effects	No Effects	No Effects
Picloram	Unknown	No Effects	No Effects	Unlikely
Sulfometuron Methyl	No Effects	No Effects	Unlikely	No Effects
Triclopyr	No Effects	No Effects	No Effects	Unlikely

No Effects = No effects have been shown in laboratory tests and it is not considered a hazard to humans.

Unlikely = Inconsistent or isolated effects have been shown in laboratory tests and it is not considered a hazard to humans at expected exposure levels.

Unknown = Laboratory tests are inconclusive or further testing is required.

Sources: EXTOXNET 2002, EPA 2002, Bio-Weed® 2002, U.S. Forest Service 2001a, and U.S. DOE.

The Forest Service (2001d; 2000a; and 1999a) states that the evidence on the carcinogenicity of 2,4-D and picloram is widely debated. Current evidence is mixed, and these compounds seem at most weakly carcinogenic. The Forest Service Project File on the Risk Assessments cited above (U.S. Forest Service 1992; Monnig 1988) contains a letter from Dr. John Graham of the Harvard University School of Public Health stating that the weight of evidence that 2,4-D is a carcinogen is not strong, and even if it is ultimately shown to be carcinogenic, it is unlikely to be a very potent one. In addition, the Science Advisory Board (EPA 1994) at the request of the EPA reviewed 2,4-D and concluded:

> Epidemiologic cohort studies have generally shown no increased risk of cancer, albeit that all of the populations for which specific exposure to 2,4-D have been identified were small, and the follow up period short...The committee concluded that current studies cannot distinguish whether observed risks reported are due to the use of 2,4-D...The Committee concludes that the data are not sufficient to find that there is a cause and effect relationship between the exposure to 2,4-D and Non-Hodgkin's Lymphoma (in U.S. Forest Service 1999a).

Regarding picloram, the EPA Peer Report (EPA 1993) review of this chemical found it to be a "Group E" carcinogen. A "Group E" carcinogen is part of a group "that show no evidence for carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemilogic and animal studies" (in U.S. Forest Service 1999a).

NOELs are available for most types of laboratory toxicity tests, and indicate the highest dose in a particular test that did not result in adverse health impacts to the animal being tested

(U.S. Forest Service 2001d; 1999a). Extrapolating a NOEL from an animal study to humans is an uncertain process. The EPA compensates for this uncertainty by dividing NOELs from animal tests by a safety factor (typically 100) when deciding how much herbicide will be allowed on various foods. This adjusted dose level is referred to as the ADI and is determined by the EPA to be a dose that is safe, even if received every day for a lifetime. The ADI value is usually expressed as milligrams of herbicide allowed per kilogram of body weight. The lower the ADI value, the more toxic the herbicide. Table 4-6 lists the ADIs for herbicides proposed for use on the S-CNF with the comparatively higher acute and chronic toxicity values of the herbicides listed in Tables 4-3 and 4-5. 2,4-D has the lowest ADI value among the herbicides listed in Table 4-6.

TABLE 4-6
ADI mg/kg/day

Herbicide	ADI[1]
Picloram	0.07
2,4-D	0.01 (0.3)[2]
Glyphosate	0.1
Dicamba	0.03
Clopyralid	0.5
Triclopyr	0.025
Metsulfuron Methyl	0.25

[1] From U.S. Forest Service (1992b, in U.S. Forest Service 2001d).
[2] For 2,4-D the World Health Organization has established an ADI of 0.3.

Potential direct effects of herbicide treatment on human health and safety may occur from direct contact with a herbicide, such as when a licensed applicator sprays a herbicide. The Forest Service (2001d) discussed several factors that can affect worker dose level. Weather conditions at the time of herbicide application will affect the level of exposure. Higher winds create more herbicide drift, especially when a high-pressure nozzle is used, which increases the chance of vapors. The BMPs and mitigation measures described in *Chapter 2, Alternatives* include restrictive herbicide application procedures depending on wind velocity and direction. Using appropriate personal protective equipment as required by label can lower the exposure for workers by as much as 68 percent (U.S. Forest Service 1992; in U.S. Forest Service 2001d). This is an especially important factor since most application exposure to herbicides is through the skin and not the lungs (Monnig 1988; in U.S. Forest Service 2001d). Also, the attention and care that a worker uses when mixing, loading, and applying herbicides greatly influences the risk of exposure. To reduce these risks, it is essential that workers receive proper training and certification in mixing, loading, and applying herbicides.

In the Risk Assessments cited above, the Forest Service (in U.S. Forest Service 2001d) has calculated that the 1 day (ADI) dose for workers applying 2,4-D with a backpack sprayer could potentially exceed the EPA's recommended daily dose. However, these risks were determined to be very small because the spraying would only take place a few weeks each

year, as compared to the EPA's ADI values, which assume a lifetime of daily doses. In addition, using all BMPs and mitigation measures listed in *Chapter 2, Alternatives* for the Proposed Action and following the herbicide mixing, loading, and disposal procedures described in Appendix D during weed treatment would reduce the incidence of worker exposure to herbicides. The Forest Service (2000a) also noted that the application rate in pounds of active ingredient per acre is typically below those used in testing and thus adds another margin of safety. This same rationale applies to the aerial application of herbicides, because of the 20 BMPs and mitigation measures listed in *Chapter 2, Alternatives* that are specifically directed at the proper and safe application of herbicides and because of the aerial spray recommendations described in Appendix E of this EIS.

The Forest Service (2001d; 1999a) also acknowledged the possibility of idiosyncratic responses such as hypersensitivity in a small percentage of the population. Such individuals are usually aware of their sensitivities because various natural and synthetic compounds typically trigger them. These persons would not be permitted to work on herbicide spray crews.

Potential indirect effects of herbicide treatment on human health and safety may occur from secondary contact by the public with a herbicide. An example evaluated in three other Forest Service documents (U.S. Forest Service 2001d; 1999a; 2000a), based on findings of the previously referenced Risk Assessments, is when people pick berries (or another wild food) in an area that has been treated with a herbicide. For example, if huckleberry plants occurred on the edge of a spray zone and received spray drift containing 2,4-D, a 150-pound person would have to consume 210 pounds of huckleberries each day for a lifetime to reach the EPA's ADI for 2,4-D listed in Table 4-6 (U.S. Forest Service 2001d). In a worst-case scenario of this example, if huckleberry plants are inadvertently but directly sprayed, a 150-pound person would have to consume a half pound of huckleberries each day for a lifetime in order to reach the EPA's ADI for 2,4-D (U.S. Forest Service 2001d).

The Forest Service (2001d; 2000a) stated for the above example that the likelihood of a person reaching the ADI for 2,4-D is low for several reasons. First, the probability that a person would pick and consume a half pound of huckleberries every day of their life is extremely low. Second, the time period when the plants are unintentionally sprayed and the berries dry up would be generally less than a week, which reduces the likelihood that those berries would be picked. Weed treatment information would be made available at District offices would discourage berry picking at those sites. There is also the likelihood that in many areas of the S-CNF, most spraying of weeds would occur along road ROWs where the occurrence of wild foods such as berries and mushrooms is probably low, although if present they may be picked by the public. In addition, wild foods are typically gathered in small quantities from widely scattered areas, making it unlikely to reach the one-half pound of food level per day every day from the same location (U.S. Forest Service 2001d; 2000a).

The Forest Service (2001d) cited results of the Risk Assessments (U.S. Forest Service 1992; Monnig 1988) on the risk of exposure to people hiking through a recently sprayed area. In this setting, the primary ingestion route for the herbicide would be through the skin. If a hiker walked through an area just sprayed with 2,4-D, the dose of 2,4-D received would be 40 times lower than the EPA's ADI for 2,4-D. In the case of picloram, the dose received in 1 hour by people picking berries in an area recently sprayed with this chemical would be 37 times lower than the EPA's ADI (U.S. Forest Service 2001d).

Human health and safety could potentially be impacted in the event of an accidental herbicide spill. The Forest Service (1999a) reported that an examination of accident records for a 10-year period revealed no major accidents involving herbicide application projects. The Forest Service Northern Region Health Risk Assessment (Monnig 1988, in U.S. Forest Service 1999a) states that spills of concentrate directly onto people could cause acute effects such as nausea, trembling, and headaches, depending on the degree of exposure, time to cleanup, and individual factors. The calculated probability of truck spills involving herbicides, assuming 1,220 weed treatment projects per year, ranged from five accidents every 1,000 years to one accident in 2,400 years. The probability of such an accident involving a drinking water reservoir was conservatively calculated at one accident every 34,000 years (Monnig 1988; in U.S. Forest Service 1999a). To prevent and reduce the risk of the occurrence of accidental herbicide spills on the S-CNF, a number of BMPs and mitigation measures were identified in *Chapter 2, Alternatives* for both the ground-based and aerial application of herbicides. Examples include defined procedures for mixing, loading, and disposing of herbicides; only mixing herbicides at sites where spills into streams could not occur; properly calibrating, rinsing, and cleaning equipment; having an approved herbicide emergency spill plan and spill containment equipment available during herbicide application in the unlikely event a spill did occur; maintaining various-sized, no-treatment/no-spray buffer zones around water bodies, depending on the method of herbicide application; and many others.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under the Proposed Action are designed to avoid or minimize the potential for adverse effects on public health and safety and worker health and safety on the S-CNF. They focus on the proper ground-based and aerial application of herbicides and on weed prevention and management BMPs. They are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures*, and in Procedures for Mixing, Loading, and Disposal of Herbicides and Herbicide Spill Plan for Noxious Weed Control on the SCNF (Appendix D). They include the 23 directives that specifically address precautionary, notification, and other safeguarding measures associated with the ground-based application of herbicides that were described for the No Action Alternative, plus 22 additional measures specifically directed at the proper aerial application of herbicides under the Proposed Action. Examples of these measures were described in the previous discussions of direct and indirect effects on human health for the Proposed Action. In addition, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives* and the Herbicide Leaching Sensitivity Evaluation System that is presented in Appendix F. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment method that achieves weed management goals with the least impact on S-CNF resources. The protection of worker and public health and safety in selecting and implementing a site-specific treatment process has the very highest priority.

Cumulative Effects. Potential cumulative effects would apply to workers and to the public who may be repeatedly exposed to herbicides over an extended period of time. The ADIs listed in Table 4-6 are based on the level of herbicide that would be acceptable each day for a lifetime. As noted in other assessments of herbicide toxicity (U.S. Forest Service 2001d), a person may be exposed to some quantity of herbicide over time, but since spraying would occur for only a few weeks each year, the daily intake would not approach the EPA's ADI

standards. There would probably be no cumulative effects on the public or workers from the effects of other ongoing activities or future actions on the S-CNF that are unrelated to weed treatments, such as roads and trails, recreation, and livestock grazing. The Risk Assessments cited previously (U.S. Forest Service 1992; Monnig 1988) assume that 2,4-D and picloram are carcinogenic, although as discussed previously current evidence on this is mixed. The Risk Assessments also assume that any dose of a carcinogen could cause cancer and that the probability of cancer occurring increases with increasing doses. The estimated probabilities of developing cancer from exposure to 2,4-D or picloram are based on a conservative extrapolation from cancer rates in animals subjected to a given chemical over a lifetime. The Risk Assessments projected that cancer rates would be highest for workers rather than the general public because their doses would be highest. Cancer probabilities of workers would increase by about one in a million after spraying 2,4-D for 193 days or picloram for 17,000 days (Monnig 1988 in U.S. Forest Service 2001d). These estimates were based on a worst-case scenario of a high dose of herbicide with a low amount of worker protection. Given the various forms of BMPs and mitigation measures that are aimed at human health protection, the cumulative impact from herbicide spraying on the S-CNF while complying with all EPA label directions would not be expected to be significant.

Table 4-7 provides some perspective on the estimated cancer risks projected for spraying 2,4-D and picloram versus other activities. For example, one round-trip transcontinental air trip represents an increased risk of cancer from cosmic rays of approximately one in a million. The same level of increased risk is associated with living in Denver, Colorado, for 1.5 months rather than at sea level because of increased cosmic rays, as well as from smoking two cigarettes, or receiving 20 days of natural background radiation. The Forest Service (1999a) reported that cancer risks to members of the general public are 100 to 1,000 times less than the risk to workers when considering exposure to the same herbicide. They continued that risks on this order could not be detected by epidemiology studies as conducted by the National Cancer Institute and that since the average American has about a 1 in 4 chance of developing cancer in his or her lifetime, the cumulative impact from spraying at the rates proposed would not be significant.

There has been an increasing scientific concern and public debate over EDCs and their effect on human and wildlife endocrine systems in the last decade. Ecologists, epidemiologists, endocrinologists, and toxicologists have called attention to the potential hazardous effects that estrogenlike and antiandrogenic chemicals and certain other environmental chemicals may have on human health and ecological well-being. They assert that certain chemicals may disrupt the endocrine system. Because EDCs mimic the effects of some hormonal or reproductive responses, they are often blamed for decreases in fertility, altered sexual characteristics in wildlife, or increases in certain cancers.

The endocrine system is a complex system of regulatory processes. It was originally thought to consist of glands that secreted hormones into the blood stream to specific receptors, producing characteristic actions. Currently, new discoveries have expanded the endocrine system to other chemical regulators such as neurohormones. There are numerous intercellular regulators as well (WHO 2002). Endocrine systems also control metabolism and regulate body processes like kidney function, body temperature, and calcium regulation. Manifestations of endocrine disruption are known to occur in the reproductive system; most

of the existing studies involve observance of EDCs in the reproductive system. However, potential EDCs could interfere with thyroid, cortisol, insulin, and other growth regulators.

The concern over EDCs focuses primarily on synthetic chemical compounds; however, naturally occurring EDCs (such as soy proteins) can also affect hormonal processes (Safe et al. 2000). The World Health Organization (WHO) also recently asserted that it is plausible (though uncertain) that exposure to EDCs could damage certain reproductive and developing systems in humans and wildlife (WHO 2002.) Possible human health effects include breast cancer and endometriosis in women, testicular and prostate cancers in men, abnormal sexual development, reduced male fertility, alteration in pituitary and thyroid gland functions, immune suppression, and neurobehavioral effects.

In addition to potential human health effects, there are also reports that many synthetic chemicals released into the environment may disrupt normal endocrine function in a variety of aquatic life and wildlife. Some of the effects observed in animals have been attributed to some persistent organic chemicals such as polychlorinated biphenyls, DDT (dichlorodiphenyltrichloroethane), dioxin, and some pesticides. Adverse effects include abnormal thyroid function and development in fish and birds; decreased fertility in shellfish, fish, birds, and mammals; decreased hatching success in fish, birds, and reptiles; demasculinization and feminization of fish, birds, reptiles, and mammals; defeminization and masculinization of gastropods, fish, and birds; decreased offspring survival; and alteration of immune and behavioral function in birds and mammals. Some argue that these adverse effects may be due to an endocrine disrupting mechanism (EPA 1997). However, the causal link between exposure and endocrine disruption in wildlife is unclear (WHO 2002).

It is unknown whether herbicides have the same effect as DDT and other pesticide compounds. For example, 2,4-D mimics the growth hormone auxin, which in turn causes uncontrolled growth and eventually death in target plant species (Tu et al. 2001). This potential hormone disruption implicates 2,4-D as an endocrine disrupter. A recent study showed that 2,4-D does not influence male-to-female sex reversal in alligators (Guillette et al. 2000). However, little connection has been made between endocrine disruption in other wildlife or human health and herbicide use, primarily because information is not available (Safe et al., 2000).

The Forest Service (2001d) summarized previous reports on the possible synergistic effects of herbicides. Synergism is when the combined cumulative impact of two or more chemicals exceeds the impacts that would result from adding their individual effects. The previously referenced Risk Assessments considered various possible synergistic effects, including interactions of active and inert ingredients in a herbicide formulation; interactions of herbicides and other chemicals in the environment; and the cumulative effects of herbicide treatments on the S-CNF and other herbicide use the public might be exposed to, such as on adjacent non-National Forest lands from the three CWMAs programs. The Forest Service (2001d) concluded that there are a number of reasons to expect that synergistic or other unusual cumulative interactions would be rare. They cited work by Mullison (1985), Monnig (1988), Forest Service Risk Assessment (1992), and EPA (EPA 1994) on the low teratogenic, mutagenic, and carcinogenic properties of herbicides compared to naturally occurring chemicals in food. They also noted that the low and short-lived doses that would result from spraying these herbicides would be very small compared to many other

chemicals in the environment. Finally, they cited the EPA's *Guidelines for the Health Risk Assessment of Chemicals* that appeared in the Federal Register on September 24, 1986, that a synergistic effect is not expected for these relatively small doses of herbicides. The Forest Service (2001d) cites recent research by Arnold et al. (1996) and a review of this work by Kaiser (1996) on the synergistic effects of four herbicides (three of these have been banned in the U.S.), but concludes that there is not yet sufficient scientific research that the chemicals proposed for use would exhibit synergistic effects.

TABLE 4-7
One-In-One-Million Risks of Cancer Death

Source of Risk	Type and Amount of Exposure
Herbicide Worker[1]	• 2,4-D 193 days • Picloram 17,000 days
Cosmic Rays[2]	• One transcontinental round trip by air: living 1.5 months in Colorado compared to New York • Camping at 15,000 feet over 6 days compared to sea level
Eating and Drinking[2]	• 40 diet sodas (saccharin) • 6 pounds of peanut butter (aflatoxin) • 180 pints of milk (aflatoxin) • 200 gallons of drinking water from Miami or New Orleans • 90 pounds of broiled steak (cancer risk only)
Smoking[2]	• 2 cigarettes
Other—20 days of sea level natural background radiation[2]	• 2.5 months in masonry rather than wood building • 1/7 of a chest x-ray using modern equipment

[1]From Monnig (1988, in U.S. Forest Service 2001d).
[2]From Crouch and Wilson (1982, in U.S. Forest Service 1999a).

The Forest Service cannot absolutely guarantee the absence of a synergistic reaction between the herbicides proposed for use on the S-CNF and other chemicals to which workers or the public might be exposed. However, based on the best scientific information available and assuming the full implementation of all BMPs and mitigation measures identified in *Chapter 2, Alternatives* for the aerial and ground-based application of herbicides under the Proposed Action, it would be reasonably expected that human health impacts from herbicide applications on the S-CNF and immediately adjacent areas would be insignificant.

c. Alternative 1

Direct and Indirect Effects. Direct and indirect effects on human health and safety under Alternative 1 would generally be similar to those effects described for the Proposed Action, with one important difference. There would be no aerial application of herbicides under Alternative 1, making it a less aggressive weed treatment alternative than the Proposed Action. A combination of primarily biological and ground-based chemical methods rather than aerial herbicide application would be used to treat weed infestations on the S-CNF

under Alternative 1. Some weed infestations would be more difficult to access and require more time to treat and likely less effectively under Alternative 1 compared to aerial herbicide applications under the Proposed Action. There also would be a greater chance of physical injuries with increased ground applications in rugged remote country compared to the Proposed Action. There also may be minor long-term benefits to human health and safety with anticipated reductions in the size of weed infestations because of weed treatments and, therefore, reduced potential for scrapes, scratches, cuts, skin irritations, allergies, and other relatively mild effects associated with weed treatment. The potential for fire within the wildland interface and risk to human health and safety also would be reduced under Alternative 1. There would be a reduced potential for herbicide spray drift under Alternative 1, because there would be no aerial application of chemicals. This would reduce the potential for inadvertently impacting forest users possibly hiking or gathering wild foods, although the potential for adverse effects from these actions was described as being very low to unlikely under the Proposed Action.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 1 would be the same as for the Proposed Action, except for measures dealing with the aerial application of herbicides. These measures are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures,* and are designed to avoid or minimize the potential for adverse effects on human health and safety. Alternative 1, like the Proposed Action, also incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives* and a Herbicide Leaching Sensitivity Evaluation System (Appendix F). These management tools are used to select a site-specific treatment method that achieves weed management goals with the least impact to S-CNF resources present at or near the treatment site. As noted for the Proposed Action, protecting worker health and safety and the general public's health and safety would receive the very highest priority when selecting and implementing a site-specific treatment process.

Cumulative Effects. The potential for cumulative effects on human health and safety under Alternative 1 would be essentially the same as described for the Proposed Action, and for the same reasons, although there would be a reduced cumulative effects potential to CWMA workers with no aerial herbicide applications. As noted for the Proposed Action, the Forest Service cannot absolutely guarantee the absence of a cumulative, synergistic reaction between the herbicides proposed for use on the S-CNF and other chemicals to which workers or the public might be exposed. However, based on the best scientific information available and assuming the full implementation of all BMPs and mitigation measures identified in *Chapter 2, Alternatives* for the ground-based application of herbicides under Alternative 1, it would be reasonably expected that human health impacts from herbicide applications on the S-CNF and actions occurring on adjacent areas would be insignificant. There would likely be no cumulative effects on the public or workers from the effects of other ongoing or future activities on the S-CNF that are unrelated to weed treatments.

d. Alternative 2

Direct and Indirect Effects. There would be no potential for herbicide-related effects on worker health and safety or the general public's health and safety under Alternative 2, because herbicides would not be used to treat weeds. Discussions for the Proposed Action concluded that the potential for herbicide-related risk was very low and any effects that may

occur would be insignificant to small. Alternative 2 would completely remove the potential for even only an insignificant herbicide-related impact on human health and safety to occur. Workers using biological controls, mechanical methods, controlled grazing, and site restoration techniques (where appropriate) under Alternative 2 would be subject to the same kinds of effects, such as sprains, strains, cuts, and scratches, as described for the Proposed Action. However, there would be a greater chance for such effects and physical injuries with the increased use of mechanical treatments and on-ground treatments in remote rugged areas under Alternative 2. The potential for fire within the wildland interface and risk to human health and safety as a result of weed infestations would likely be greater under Alternative 2 than under the Proposed Action, Alternative, 1, or the No Action Alternative.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with weed management under Alternative 2 are designed to avoid or minimize the potential for adverse effects on S-CNF resources, with human health and safety receiving the highest priority. They focus on weed prevention and management BMPs and are described in detail in *Section 2.D.3, Management Practices and Mitigation Measures.* Alternative 2, like the Proposed Action, incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in *Chapter 2, Alternatives.*

Cumulative Effects. There would be no potential for herbicide-related cumulative, synergistic impacts on human health and safety under Alternative 2 because herbicides would not be used to treat weeds on the S-CNF. Discussions for the Proposed Action and Alternative 1 concluded that the potential for this herbicide-related risk was very low and any effects that may occur would be insignificant. Alternative 2 would completely remove the potential for even only an insignificant herbicide-related impact on human health and safety to occur. There would likely be no cumulative effects on the public or workers from the effects of other ongoing or future activities on the S-CNF unrelated to weed treatments.

4.D.2. Indian Trust Assets/Treaty Rights

As noted in *Chapter 3*, administration of Indian Trust Assets is the responsibility of the federal government. Meetings with the Shoshone-Bannock Tribes have yielded important issues that would potentially be affected by weed management efforts. These are:

- Protection of big game winter range, especially for elk, moose, bighorn sheep, deer, antelope, and mountain goat.
- Protection of small game and mammals.
- Protection of resident indigenous and anadromous fish habitat.
- Access to traditional plant resources, such as, but not limited to, bitteroot, chokecherry, elderberry, current, red twig dogwood (red willow), and lodgepole pine collection areas.
- Unrestricted access for hunting, fishing, and gathering.

S-CNF personnel will consult with the Shoshone-Bannock Tribes, and other Tribes that may have assets within the S-CNF before implementing the selected preferred alternative.

a. No Action Alternative

Direct and Indirect Effects. The No Action Alternative would continue current weed management strategies described in *Chapter 2, Alternatives* but it is not expected to slow the spread of noxious weeds. Given the widespread nature of the noxious weed problem and the relative ineffectiveness of current measures on large infestations, current treatments would not be expected to slow or stop the spread of weed species on the S-CNF.

As noted in prior sections of this chapter, the continued spread of noxious weeds would have adverse direct and indirect effects on native plant communities, potentially including those used by Native American Tribes. Noxious weeds can decrease plant diversity, structure, and function in native plant communities by outcompeting native species for available resources. Big game winter range would also be affected, as weeds continue to spread into these areas. Other Indian Trust wildlife issues (such as big game and wildlife with religious or cultural significance) would be directly affected by loss of cover, forage, and habitat.

Other Trust Assets that would also be directly affected are anadromous fisheries and their habitat, which may experience degradation due to increased sediment delivery to streams from increasing weed infestation. Indirect effects would occur as infested riparian habitat changes to a less diverse plant community. Soil degradation from weed invasions would indirectly affect these Trust resources as water quality declines and sediment increases.

Drift or chemical odor from herbicide applications or noise and dust from mechanical treatments may cause direct adverse effects on Trust Assets or religious sites. Additionally, individual non-target native plants that have cultural importance may be inadvertently killed during mechanical or herbicidal treatment. Inadvertent effects from trampling and the generation of noise and dust during mechanical treatments and from possible herbicide drift may result in some mortality of forbs and a year or more setback in some shrubs, evidenced by leaf loss and berry failure. BMPs described in the following text are designed to prevent the occurrence of adverse effects such as these.

BMPs and Mitigation Measures. BMPs and mitigation measures for this alternative are discussed in *Section 2.D.3, Management Practices and Mitigation Measures*. Any potentially adverse effects on Indian Trust Assets—and corresponding mitigation measures—would be reviewed and coordinated with the Shoshone-Bannock resource technical staff. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets.

Numerous BMPs designed to prevent or reduce the risk of the occurrence of adverse effects on S-CNF resources were described in previous discussions of the No Action Alternative in this chapter. All of these BMPs are relevant to the protection of Indian Trust Assets. Examples include compliance with all State and Federal laws and agency guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; compliance with restrictions that have been designated for no-spray buffer zones within all flowing water streams and ponded water bodies; no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; use of label-approved aquatic formulations near open water; evaluate treatment sites and survey, as necessary, for sensitive plant suitability; no

chemical will be applied directly on sensitive plants during spot application; a 100-foot buffer zone will be employed around known populations of sensitive plants during broadcast applications; and weed-specific herbicides, such as Clopyralid, will be used on big game winter range to minimize impacts to winter forage. In addition, prehistoric trails, remnants of historic structures, and other heritage resources including Indian Trust Assets will be protected from disturbance during treatment activities.

Cumulative Effects. Cumulative effects of this alternative on Indian Trust Assets would be similar to the cumulative effects of the No Action Alternative discussed in the vegetation, aquatic, and wildlife resources sections of this chapter. Cumulative effects on noxious weeds resulting from treatments under the No Action Alternative combined with treatments under the three CWMAs would generally be expected to result in some localized eradication, control, and containment of noxious weeds. However, under the No Action Alternative, weed infestation on the S-CNF would be expected to continue to increase. This would reflect large-scale limitations on being able to eradicate, control, or contain new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, or to prevent or reduce the risk of the invasion of adjacent land by weeds presently occurring on the S-CNF. This cumulative effect could potentially adversely affect vegetative, aquatic, and wildlife Indian Trust Assets through a number of mechanisms, such as reduced native plant communities, increased sediment delivery to drainages, reduced wildlife habitat, and decreased ecosystem function. Weed treatments on the S-CNF and immediately adjacent lands treated under the CWMAs may also result in some cumulative impacts on Indian Trust Assets from the combined effects of mechanical treatment and possibly herbicide spray drift.

Additional cumulative effects on Indian Trust Assets associated with other ongoing activities on the S-CNF may occur if those activities adversely affect plants, fish, wildlife, or their habitat. Such effects may result from activities that contribute additional sediment to drainages or that result in the loss or disturbance of a resource or its habitat. Examples include potential impacts from the construction, maintenance, and use of roads and trails and possibly livestock grazing and recreation activities near drainages. Livestock grazing and recreation both have the potential to directly and cumulatively affect Indian Trust Assets since both these activities have the potential to disturb plants.

b. Proposed Action

Direct and Indirect Effects. The direct and indirect benefits of the Proposed Action on Indian Trust Assets include those benefits described in the vegetation, aquatic, and wildlife resources section of this chapter that would result from the aggressive treatment and reduction in acres of noxious weeds across the S-CNF. A variety of terrestrial and aquatic plants and animals, including sensitive special status species and their habitats, would benefit. As analyzed in Sections 4.B.2 and 4.B.3, minimal or no adverse impacts to aquatic and wildlife habitat or species would be expected. During weed treatment, access to some Trust Assets may be limited for a short time.

The Proposed Action, like other alternatives described in this chapter, may have some adverse impacts on Indian Trust Assets. There may be short-term adverse effects on Trust Assets from herbicide odor and drift to non-target areas during aerial spraying. Other adverse, short-term effects may stem from chemical odors and drift as ground-based herbicides are applied, the same as described for the No Action Alternative. Noise, dust,

and trampling from mechanical treatments may also affect Trust Assets. Individual non-target plants could be inadvertently killed during treatment, although BMPs and mitigation measures referenced below would be followed to avoid or minimize this potential occurrence. Access for the cultural gathering of plants may be affected, but only for a short time as weed treatment is implemented and briefly thereafter. The experience of Native Americans using Trust Assets may be influenced by the users' knowledge that weed control activities are occurring, or have occurred, on or near Trust lands.

BMPs and Mitigation. The previous resource discussions note the 59 BMPs and mitigation measures that would be implemented under the Proposed Action to avoid or minimize impacts on all S-CNF resources including Indian Trust Assets. In addition, a site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy would be employed at a treatment site to avoid or minimize the potential for impacting Indian Trust Assets. Any potentially adverse effects on Indian Trust Assets—and corresponding mitigation measures—would be reviewed and coordinated with the Shoshone-Bannock resource technical staff. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets.

Cumulative Effects. Potential cumulative impacts on Indian Trust Assets under the Proposed Action would consist of those effects described in the vegetative, aquatic, and wildlife resources sections of this chapter. Nearly all of these effects would be beneficial as the various weed treatments on the S-CNF, in concert with weed treatments on adjacent lands under the CWMAs, become successful and together result in fewer noxious weeds, improved native plant communities, reduced sediment delivery, increased wildlife habitat, and enhanced ecosystem function. Other ongoing S-CNF activities that were described for the No Action Alternative may also cumulatively impact Indian Trust Assets under the Proposed Action. Livestock grazing and recreation both have the potential to directly affect Indian Trust Assets since both of these activities have the potential to disturb plants.

c. Alternative 1

Direct and Indirect Effects. This alternative would be identical to the Proposed Action, except no aerial herbicide application would occur. As discussed in earlier sections of this chapter, large weed infestations in areas most common on the northern part of the S-CNF may not respond to the treatments described for this alternative, at least not as quickly as with the Proposed Action. These large infestations occur on steep, inaccessible areas where treatment would be more difficult and less effective to implement. As a result, it is possible that weed populations in these areas could continue to adversely affect Indian Trust Assets. Direct and indirect effects on vegetation, aquatic, and wildlife resources that could also adversely affect Trust Assets were discussed earlier in this chapter.

Other effects of Alternative 1 include the potential loss of individual native plants during treatment, chemical odors from ground-based herbicide applications, and noise and dust from mechanical operations. The potential for herbicide drift from aerial spraying would be eliminated, but chemical odors and possible drift from ground-based herbicide application may still affect Indian Trust Assets. The experience of Native Americans using Trust Assets may be affected if the users know that weed control treatments are occurring nearby, or if access to these assets is restricted during treatment.

BMPs and Mitigation Measures. The BMPs and mitigation measures for this alternative are described in *Chapter 2, Alternatives* and include all of those for the Proposed Action, except measures dealing with aerial herbicide application. Any potentially adverse effects on Indian Trust Assets—and corresponding mitigation measures—would be reviewed and coordinated with the Shoshone-Bannock resource technical staff. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets.

Cumulative Effects. Potential cumulative effects on Indian Trust Assets under Alternative 1 combined with the treatment effects from the three CWMAs would consist of those effects on vegetation, aquatic, and wildlife resources described previously in this chapter. Those effects would be similar to effects described for the Proposed Action, except that cumulative benefits would not be realized as quickly because of the lack of aerial herbicide use under this alternative. Adverse cumulative effects on Trust Assets from other ongoing activities on the S-CNF (for example, recreation activities and livestock grazing) would be similar to those described for the Proposed Action.

d. Alternative 2

Direct and Indirect Effects. This alternative would not incorporate herbicide applications, thus eliminating any potential risks of drift or chemical odor. However, as noted in previous resource discussions, this alternative would have less effect on weed control and expansion since the range of weed treatments is limited. This would result in limited treatment success and fewer benefits to Indian Trust Assets compared to the Proposed Action, Alternative 1, and the No Action Alternative. However, with the continued alteration of native terrestrial and aquatic habitat anticipated under Alternative 2, Trust Assets and Treaty Rights would be adversely impacted. Other treatment effects include noise, dust, smoke, and surface disturbance/trampling of non-target species from mechanical treatments, which would be much more extensive under this alternative than under any of the other alternatives.

BMPs and Mitigation. The BMPs and mitigation measures for this alternative are described in *Chapter 2, Alternatives* and include all of the measures for the Proposed Action except those related to herbicide use. Any potentially adverse effects on Indian Trust Assets—and corresponding mitigation measures—would be reviewed and coordinated with the Shoshone-Bannock resource technical staff. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets.

Cumulative Effects. Potential cumulative effects on Indian Trust Assets under Alternative 2 would consist of those effects on vegetation, aquatic, and wildlife resources described previously in this chapter. Those effects would be similar to effects described for Alternative 1, except that cumulative benefits would not be realized as quickly because of the lack of aerial herbicide use under this alternative. Adverse cumulative effects on Trust Assets from other ongoing activities on the S-CNF (for example, recreation activities and livestock grazing), as well as the increased use of mechanical treatments under Alternative 2, would be greater than those described for the Proposed Action due to the increase in surface disturbance from mechanical treatment methods.

4.D.3. Environmental Justice

Executive Order 12898 directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. The Proposed Action and alternatives analyzed in this Final EIS would not alter the type of access (motorized versus non-motorized) to treatment areas on the S-CNF and the alternatives would not alter opportunities for subsistence hunting by Native American Tribes.

Neither the Proposed Action or any of the alternatives would alter subsistence rights and fishing by Native American Tribes, and they would not have a disproportionate impact on minority and low-income populations.

4.D.4. Economics

The treatment of noxious weeds is important to the economy of areas surrounding the S-CNF, and the health of the Forest's environment. The loss of wildland and range has direct and indirect economic effects. The methods selected for weed control will also have direct and indirect economic effects.

a. No Action Alternative

Direct and Indirect Effects. The spread of noxious weed species and the establishment and spread of new species would likely continue under the No Action Alternative, as described in *Section 4.B.1, Vegetation Resources and Noxious Weeds,* of this chapter. The continued loss of wildland acres, roughly valued at $3.95 per acre, and rangeland acres, roughly valued at $10.73 per infested acre, would result in direct negative economic impacts to the S-CNF (Hirsch and Leitch 1996) and to adjacent communities. Current loss of wildland acres is nearly $300,000, and would likely increase as additional wildland acres are lost to expanding weed infestations.

The S-CNF and adjacent communities would share the economic impact of these losses since these communities rely on the resources offered by the S-CNF for their livelihood. Direct and indirect effects on vegetation, fisheries, wildlife, and ecosystem function (described earlier in this chapter) would also influence the economic well-being of these adjacent communities. Economic sectors most affected by this alternative would include commercial (grazing, tourist) and recreational uses. The impact of the No Action Alternative on these economic sectors is discussed in detail in *Section 4.C.4, Land Uses and Designations*, of this chapter.

Job opportunities related to current weed management are not a part of this study. As noted earlier in this chapter, job loss related to increasing weed infestations on the S-CNF would likely affect surrounding communities and economic sectors that rely on the resources offered by the S-CNF. Jobs related to weed control efforts would not increase under this alternative.

Indirect economic effects could possibly occur from degradation of water quality and increased cost of sediment control in community water treatment systems if these effects are severe enough. These indirect effects have not been quantified.

Cost effectiveness: The cost effectiveness of this alternative is considered moderate to low because fewer acres would be treated under this alternative, and it would not meet the

weed treatment goals. The estimated annual cost of treating 3,500 acres under this alternative is approximately $843,000 ($241 per acre).

BMPs and Mitigation Measures. BMPs and mitigation measures have not been developed to specifically address economic effects of this alternative.

Cumulative Effects. It is difficult to assess the cumulative impacts or assign general economic loss to various economic sectors as a result of the No Action Alternative when combined with the effects of other ongoing S-CNF activities and the effects of weed treatment under the three CWMAs. Studies similar to the Montana Economic Impact Study (Hirsch and Leitch 1996) have not been performed on Idaho's natural resources, and the cumulative impact cannot be fully defined. However, one possible negative cumulative effect would be the additional costs necessary to treat and control weeds under the three CWMAs if weeds cannot be effectively treated and managed on the S-CNF, as indicated for the No Action Alternative. Wildlands have intangible, non-market benefits, such as healthy, resilient ecosystems. The cumulative economic impacts on these non-market sectors are difficult to assess, although they can be assumed from tourism and recreation data.

b. Proposed Action

Direct and Indirect Effects. The immediate direct effect of the Proposed Action would be to control, contain, and/or eradicate weed populations on the S-CNF. Given the economic cost of the No Action Alternative, a direct effect would be in savings of wildland acres. A conservative estimate would include the savings of currently infested wildland acreage in an amount of $262,964 (see *Section 4.C.4, Land Uses and Designations* of this chapter for calculations).

Other economic effects would include the cost of herbicides and other weed treatments. A rough estimate of the cost of the Proposed Action would depend on the specific type of treatments within a treatment category that are chosen, according to the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy.

New jobs from these activities may not have a direct impact on the environment, but would directly benefit surrounding communities.

Other impacts would occur where noxious plants begin to die off and native plant populations have not yet recovered. Soil conditions may require some temporary expenditures to prevent or reduce the risk of erosion-related impacts and to hasten the restoration of treatment sites, where appropriate. These impacts should decrease as native plant populations recover.

Cost effectiveness. Each of the control methods used for this alternative have different costs associated with their implementation. This alternative would have high cost effectiveness; treatment methods could be selected to most efficiently and effectively meet the treatment goals. Cost estimates for the treatment methods are described below. Table 4-8 compares the costs for each alternative. Table 2-8 (in Chapter 2) provides detailed cost comparisons among the alternatives.

Mechanical. In the Lolo National Forest, people were actually timed to dig and pull knapweed. Based on that experience, as well as experience in other forests and the S-CNF, estimated costs for mechanical methods are described below:

- *Hand pulling.* One person would take about 48 days (9.7 weeks) to hand pull 1 acre of moderately to densely infested ground on flat terrain to 100 percent elimination of the weeds. Bagging and disposal would take an additional 3 hours a week (or 29 hours for 9 weeks). A seasonal employee to perform the service costs approximately $110/day.

  Math: (1 person x $110/day) x 48.25 days (needed to pull one acre) = $5,307 per acre; 29 hours x $110 = $3,190 for disposal; $5,307 (pulling) + $3,190 (disposal) = $8,497 per acre for one treatment. Administrative costs and travel are not included in this estimate. Hand pulling may not be used in this alternative, but is presented for comparison.

- *Mowing.* A conservative estimate for mowing would be about $300 per acre. Mowing would be feasible on flat to gentle slopes, with no surface rocks, and where road access is nearby. In the largest infested sites where rough, rocky terrain prohibits mowing, mechanical control alone is not economically or physically feasible.

Herbicide Application. The cost of ground application of herbicides varies with the method used. Aerial application provides the most economical and aggressive treatment method for rugged terrain with large infestations. The cost estimates presented below do not include the cost of the herbicides, nor do they consider the economic savings of one treatment per season (with picloram) versus repeat treatments (with 2,4-D).

- *Ground Application.* Costs are derived from the Lolo National Forest *Big Game Winter Range and Burn Area Weed Management EIS*, and are based on spraying one acre.
  - Vehicle (truck): $30 per acre
  - Backpack spraying (includes personnel costs): $125 per acre
  - ATV: $60 per acre
  - Mule or Horseback-mounted sprayer: $65 per acre (based on contract price)

  The effectiveness of ground applications goes down (and cost goes up) where terrain and other factors inhibit the ability to safely complete the task.

- *Aerial application.* At $25 per acre, aerial application is the most economic of the treatment methods, and is the most effective on steep, rugged terrain.

Controlled Grazing. Costs for controlled grazing would be quite variable by contractor, location, and existing facilities. Based on similar projects described in the Lolo and Bitterroot EISs, grazing typically costs about $60 per acre.

Biological Control. Costs associated with biological control are generally based on collection and distribution. The Bitterroot Forest in Montana estimates that biological control agents can cost about $1 per bug. Typically, about 500 bugs are introduced per acre, with an overall cost between $300 to $500 per acre. The Lolo National Forest estimates

biological control costs around $10,000 per year to maintain treatments on about 21,750 acres.

- As noted in *Section 2.D.3, Management Practices and Mitigation Measures,* biological treatment methods generally require years to become effective.

  Estimated annual costs for treating 18,000 acres under this alternative are approximately $3,020,000 ($168 per acre).

BMPs and Mitigation Measures. BMPs and mitigation measures are described in *Section 2.D.3, Management Practices and Mitigation Measures*. It is expected that these measures would help keep environmental and economic costs down through the selection and implementation of a site-specific treatment method that would achieve treatment objectives but have the least overall impact on S-CNF resources, including funds available for weed treatments.

Cumulative Effects. Cumulative economic effects stemming from the Proposed Action would include decreased costs on the S-CNF and potentially on adjacent lands treated under the three CWMAs as eradication efforts become more successful and weed-infested areas decline. The economic impact of infestations spreading beyond S-CNF boundaries would be prevented and/or minimized under the Proposed Action.

c. Alternative 1

Direct and Indirect Effects. Alternative 1 incorporates the same treatment opportunities as the Proposed Action, except for the aerial application of herbicides. The direct economic effects stemming from the cost of this alternative would be essentially the same as the Proposed Action, except the cost of aerial herbicide application would not be included. Instead, weed infestations on steep, inaccessible areas of the S-CNF would be treated using a combination of ground-based methods (herbicide application and biological treatments). As noted in previous discussions, aerial spraying is the most economic and aggressive form of weed control and eradication. Mechanical methods would not be as effective in these areas, and would increase the cost of the project as increased labor is required. Ground-based herbicide application would probably require backpack spraying, another labor-intensive control method. Controlled livestock grazing and biological controls would be less successful in quickly containing, controlling, and/or eradicating large weed infestations.

These weed control opportunities would result in new jobs and have a direct economic benefit on the surrounding communities. This alternative would also cause adverse economic effects if infestations on steep inaccessible areas cannot be contained and expand into uninfested areas and beyond S-CNF boundaries. In other areas of the S-CNF, however, the direct and indirect economic effects would be similar to those described for the Proposed Action.

Cost Effectiveness. This alternative is considered to have moderate to low cost effectiveness because terrain in the largest infested areas would limit the use of more economic treatment measures. Additionally, lower cost measures for rough terrain (e.g., grazing and biological control) generally take years to become effective, and would not meet the treatment goals for the infestation. Estimated annual costs for treating 18,000 acres are approximately $6,850,000 ($381 per acre).

BMPs and Mitigation Measures. BMPs and mitigation measures for this alternative are the same as for the Proposed Action, except for BMPs associated with aerial herbicide application which would not occur with Alternative 1. This alternative also includes use of the site-specific implementation process, decision tree, minimum tool approach, and adaptive strategy to select the most effective and least-impacting treatment method.

Cumulative Effects. Cumulative economic benefits to the S-CNF and adjacent lands associated with Alternative 1 would be similar to those described for the Proposed Action. However, they may take longer to realize because of the absence of aerial herbicide application as a treatment option under this alternative.

d. Alternative 2

Direct and Indirect Effects. Alternative 2 would consist of non-chemical weed treatment methods. These techniques take time and can be labor intensive, thus increasing the potential long-term costs of this alternative.

Because large weed infestations do not quickly respond to non-chemical treatment methods, and some mechanical, biological, or combinations of treatments do not effectively eradicate some species of weeds, weed populations could expand under this alternative. Alternative 2 could prevent or minimize the potential for the expansion of weeds in small infestations, and may even eradicate some species in small infestations. However, this alternative would be comparatively less effective against large weed infestations. In particular, knapweed infestations on some of the steep, inaccessible slopes of the S-CNF will likely expand using only non-chemical treatment methods. The resulting economic effects would then resemble or be worse than those of the No Action Alternative.

Jobs created by the use of mechanical, livestock grazing, and biological methods would have no direct effect on the environment, but would directly benefit the surrounding communities. Adverse economic impacts resulting from not being able to quickly treat larger weed infestations, subsequent water quality degradation, and possibly increased cost of sediment control in community water treatment systems would be similar to those of the No Action Alternative.

Cost effectiveness. This alternative is considered to have low cost effectiveness, based on the necessity for hand-pulling and other non-mechanical methods in rough terrain. The alternative would have minimal effectiveness since less aggressive methods would fail to keep pace with large infestations. The estimated cost of treating 18,000 acres annually under this alternative is approximately $16,370,000 ($909 per acre).

BMPs and Mitigation Measures. BMPs and mitigation measures under this alternative would be identical to those for Alternative 1, except there would be no herbicide use under Alternative 2. This alternative also would include the site-specific implementation process and related components, the same as under Alternative 1.

Cumulative Effects. The cumulative effects of this alternative would be somewhat similar to those of the No Action Alternative. However, it is likely that this alternative would not be as effective on large weed infestations on the S-CNF. As a result, effectiveness of weed control efforts beyond the S-CNF boundary may be minimized, which would cause cumulative

adverse economic impacts to the S-CNF and to adjacent lands where weed treatments are covered by the three CWMAs.

4.E. Cultural Resources

4.E.1. Cultural and Historical Resources and Native American Religious Concerns

a. No Action Alternative

Direct and Indirect Effects. The continued spread of existing noxious weed species and the spread of new species would have no direct effect on non-biotic heritage resources. However, the continued spread of weeds would likely continue to displace native vegetation gathered by local Tribes. The Shoshone-Bannock Tribes have identified several species of native plants—such as bitterroot, chokecherry, elderberry, and currant—that have cultural significance. The traditional use of these plants would continue to be directly affected as weeds begin to displace native plant populations, or as access is affected by continued weed control efforts.

In some areas of the S-CNF, historic vegetation presents a critical element for the setting. For example, much of the original Lewis and Clark Trail remains intact through the S-CNF. The continued presence of noxious weeds along the trail could result in a reduction of the historical integrity of trail and camping sites. Additionally, loss of historically accurate vistas could affect the visual and recreational experience of users studying and attempting to re-create the Lewis and Clark journey.

For some historic sites such as homesteads and mining areas, vegetation is a key element contributing to the integrity of the site, and the continued presence or expansion of weed infestations represents a definite intrusion on the integrity of historic sites.

As discussed in *Section 4.D.2, Indian Trust Assets*, drift or chemical odor from herbicide applications or noise and dust from mechanical treatments may cause indirect adverse affects on Trust Assets or religious sites. Additionally, individual non-target native plants that have cultural importance may be inadvertently killed during mechanical or herbicidal treatment. Inadvertent effects from trampling and the generation of noise and dust during mechanical treatments and from possible herbicide drift may result in some mortality of forbs and a year or more setback in some shrubs, evidenced by leaf loss and berry failure. Surface disturbances from mechanical treatments would have the potential for impacting cultural resources if present at a treatment site. BMPs referenced in the following text are designed to prevent or minimize the potential occurrence of adverse effects such as these.

BMPs and Mitigation Measures. BMPs and mitigation measures are described in *Section 2.D.3, Management Practices and Mitigation Measures.* A BMP specifically directed at cultural resources is the protection of prehistoric trails, remnants of historic structures, and other heritage resources, including Indian Trust Assets, from disturbance during treatment activities. Before the No Action Alternative or any other alternative is implemented, the S-CNF archaeologist would identify areas of concern for historic preservation and Native American issues, and consult with the Idaho SHPO and the Shoshone-Bannock Tribes. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for

adversely impacting Indian Trust Assets. These entities would continue to be consulted during the implementation of this alternative.

Cumulative Effects. Cumulative effects on cultural resources under the No Action Alternative could include surface-disturbing effects from other CWMA activities along with other ongoing S-CNF activities. Mechanical treatments (or any surface disturbance including the ongoing actions of livestock grazing) could have a high risk of affecting cultural resources.

b. Proposed Action

Direct and Indirect Effects. The Proposed Action incorporates all of the available weed management strategies, and is the most aggressive of the available alternatives. One effect of the Proposed Action on cultural resources would be to control weeds, and to eventually eradicate noxious weeds from many sites on the S-CNF. Because of this, the Proposed Action offers the greatest recovery potential for currently infested historic landscapes (e.g., portions of the Lewis and Clark Trail and historic homesteads) while having a minimal effect on cultural and historic values. Reducing noxious weeds at historic sites would restore and protect the visual quality of historic sites and trails. Additionally, the Proposed Action would control and eradicate weeds that may currently encroach on culturally significant plants.

Types of potential adverse impacts on cultural resources and Indian Trust Assets from mechanical treatments and herbicide application under the Proposed Action would be similar to those described for the No Action Alternative. Some of those effects are also discussed in *Section 4.D.2, Indian Trust Assets*. There would be a greater likelihood of encountering and potentially impacting cultural resources under the Proposed Action because more acres would be treated each year than under the No Action Alternative.

Other impacts include the remote risk that individual native plants would be lost because of chemical, mechanical, and controlled grazing treatments. Access to important cultural sites may be temporarily restricted during weed treatment efforts.

BMPs and Mitigation Measures. BMPs and mitigation measures are described in *Section 2.D.3, Management Practices and Mitigation Measures*. Before the Proposed Action (or any alternative) is implemented, the S-CNF archaeologist would identify areas of concern for historic preservation and Native American issues, and consult with the Idaho SHPO and the Shoshone-Bannock Tribes. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets. These entities would be consulted during implementation of the Proposed Action, and site-specific treatment strategies using the decision tree, minimum tool approach, and adaptive strategy would be developed accordingly.

Cumulative Effects. Cumulative effects associated with the Proposed Action would be similar to those described for the No Action Alternative but would potentially occur over a broader scale. They would include surface-disturbing effects from other CWMA activities along with other ongoing S-CNF activities. Mechanical treatments (or any surface disturbance including the ongoing actions of livestock grazing) could have a high risk of affecting cultural resources.

c. Alternative 1

Direct and Indirect Effects. This alternative includes all of the available weed treatment methods except aerial spraying. Many of the direct and indirect effects of Alternative 1 would be similar to those described for the Proposed Action. However, large weed infestations in steep, inaccessible areas of the S-CNF may be difficult to eradicate. Ground-based herbicide applications and biological treatments may not be immediately effective on these particular areas containing large infestations. This may result in continued loss of native plant populations in these areas, some of which may have cultural significance.

This alternative would have a direct positive effect on the integrity of portions of the Lewis and Clark Trail that intersect northern reaches of the S-CNF. Also, Alternative 1 would prevent or reduce the risk of the expansion of existing weeds in other sections of the S-CNF, and should prevent or reduce the risk of new expansion of weed populations as well. This would prevent or minimize the potential for any future loss of native plant populations. Types of potential adverse impacts on cultural resources under Alternative 1 from herbicide application and mechanical treatments would generally be similar to those described for the Proposed Action. There would be no potential for herbicide wind drift on non-target species from aerial application under this alternative.

BMPs and Mitigation Measures. BMPs and mitigation measures would be identical to those described for the Proposed Action, except there would be no BMPs for the aerial application of herbicides since this would not occur under Alternative 1. The S-CNF archaeologist would identify areas of concern for historic preservation and Native American issues, and consult with the Idaho SHPO and the Shoshone-Bannock Tribes. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets. These entities would continue to be consulted during implementation of this alternative.

Cumulative Effects. Cumulative effects on cultural resources associated with Alternative 1 would be generally similar to those described for the Proposed Action. They would include surface-disturbing effects from other CWMA activities along with other ongoing S-CNF activities. Mechanical treatments (or any surface disturbance including the ongoing actions of livestock grazing) could have a high risk of affecting cultural resources.

d. Alternative 2

Direct and Indirect Effects. Many of the effects of Alternative 2 on cultural resources would be similar to those of Alternative 1. However, large weed infestations would take longer to treat and be less effective under this method, since the application of herbicides, which would not be used under this alternative, has been shown to be the quickest method of weed treatment. Potential adverse effects on cultural resources and Indian Trust Assets associated with mechanical treatments and ground disturbance would be greater under this alternative than the other alternatives because of the need to extensively use this particular treatment option under Alternative 2 in the absence of herbicides. Ground-disturbing activities such as these over large areas of the S-CNF could potentially impact cultural resources.

BMPs and Mitigation Measures. BMPs and mitigation measures associated with Alternative 2 are described in *Section 2.D.3, Management Practices and Mitigation Measures*. They are identical to those for the Proposed Action, except for BMPs directed at herbicide application, which would not occur under this alternative. The S-CNF archaeologist would identify areas of concern for historic preservation and Native American issues, and consult with the Idaho SHPO and the Shoshone-Bannock Tribes. Tribal staff will be informed and coordinated with on treatment areas, proposed treatment activities, and treatment schedules, prior to treatment, in order to avoid the potential for adversely impacting Indian Trust Assets. These entities would continue to be consulted during implementation of this alternative.

Cumulative Effects. Types of potential cumulative effects on cultural resources under Alternative 2 would be similar to those described for Alternative 1. However, the magnitude of potential effects would be greater under Alternative 2 because of the greater number of acres that would be treated each year and the increased likelihood of encountering cultural resources and the extensive use of mechanical treatments and ground-disturbing activities that would occur under Alternative 2.

4.E.2. Paleontological Resources

As noted in *Chapter 3* there are no known paleontological resources on the S-CNF, except for limited petrified wood locals. There are no anticipated effects from the Proposed Action or any of the other alternatives on these resources.

4.F. Comparison of Alternatives

Table 4-8 (back of Chapter) summarizes and compares the potential environmental benefits and impacts of the No Action Alternative, Proposed Action, Alternative 1, and Alternative 2 for each resource area previously analyzed in this chapter. Additional information is presented in Table 2-7 (in Chapter 2), which compares and contrasts important features, properties, benefits, and costs among the four alternatives, and in Table 2-8 (in Chapter 2), which provides supporting information and assumptions used to estimate annual costs for each of the treatment options associated with the four alternatives. The Proposed Action, followed by Alternative 1, would be the most effective of the alternatives evaluated in eradicating, controlling, and containing noxious weeds on the S-CNF and in benefiting a broad range of S-CNF resources. The No Action Alternative (No Change from Current Management) would be less effective and Alternative 2 would be the least effective of the alternatives evaluated in treating weeds and in benefiting S-CNF resources because of the comparatively few acres of weeds that would be treated each year (No Action Alternative) and the absence of herbicides as a weed treatment option (Alternative 2).

Potential risks for some S-CNF resources were identified for those alternatives that would use herbicides to treat weeds. These include aerial and ground-based herbicide applications under the Proposed Action and ground-based herbicide applications under Alternative 1 and the No Action Alternative. Such risks would be non-existent under Alternative 2. In all instances involving herbicide and other potential risks, BMPs and mitigation measures would be implemented to avoid or minimize the potential for adverse effects to occur. In addition, the Proposed Action, Alternative 1, and Alternative 2 include the use of a site-

specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment option that achieves weed management goals with the least impact on S-CNF resources. The protection of worker health and safety and public health and safety in selecting and implementing a site-specific treatment option would receive the very highest priority.

4.G. Probable Environmental Effects that Cannot be Avoided

Some potential environmental risks associated with the use of herbicides that cannot be avoided include possible effects on non-target plant species, possible entry of minute amounts into surface waters, and possible absorption by wildlife and fish. However, the extremely low amounts of herbicide that could potentially come in contact with these resources—together with the implementation of BMPs, mitigation measures, and a site-specific minimum tool process—would not be expected to result in a significant environmental impact under reasonably foreseeable circumstances. This same conclusion applies to human health and safety on the S-CNF. The anticipated continued expansion of noxious weeds on the S-CNF under the No Action Alternative would result in serious unavoidable adverse effects on a broad range of S-CNF resources, as described in detail previously in this chapter. These unavoidable adverse effects from continued weed expansion would be especially severe on the northern S-CNF because of extensive current infestations on that part of the S-CNF.

4.H. Forest Plan Consistency

The Proposed Action, followed by Alternative 1 and then the No Action Alternative, would be the most effective and quickest of the alternatives analyzed in this EIS in achieving various management goals for S-CNF resources. All three of these alternatives would be consistent with the S-CNF Plan. Alternative 2 may only minimally meet or perhaps fail to meet some of the S-CNF management goals, and in the long-term may be inconsistent with the overall S-CNF Plan. Examples of management goals contained in the S-CNF Plan include the following:

- Maintain adequate structural diversity of vegetation to ensure habitat for minimum viable populations or target populations of all wildlife species and to provide representations of the various ecological stages of endemic plant communities.

- Manage aquatic habitat to maintain or enhance the current status of threatened and endangered fish species, meet production goals for anadromous and resident species, and meet state water quality standards.

- Manage water quality and the domestic water supply such that downstream beneficial uses are protected and compliance with state standards is achieved.

- Maintain watershed condition such that downstream beneficial water uses can continue to be supported.

- Maintain wildlife habitat of sufficient quantity and quality to sustain target populations of economically important MIS species.
- Manage for a moderate increase in elk populations and manage threatened and endangered wildlife species habitat to enhance their status.
- Use an integrated approach to manage noxious and invasive weeds while protecting human health and safety; maintaining or enhancing visual resource, air quality, and cultural resource objectives; and preserving the unique characteristics of wild and scenic rivers, wilderness areas, RNAs, and roadless areas.

The Proposed Action would best meet these and other S-CNF Plan management goals. By comparison, Alternative 1, followed by the No Action Alternative, then Alternative 2 would be increasingly less effective than the Proposed Action in meeting S-CNF management goals.

4.I. Possible Conflicts With Planning and Policies of Other Jurisdictions

Neither the Proposed Action nor Alternative 1 would conflict with State and Federal water or air quality regulations, or with USFWS and NMFS service recovery plans for threatened and endangered species. However, the anticipated continued expansion of noxious weeds on the S-CNF under the No Action Alternative and especially under Alternative 2 may threaten recovery of some federally listed species. A Biological Assessment of potential effects of the Proposed Action on Federally listed endangered, threatened, proposed, and candidate species will be completed for the proposed project.

4.J. Relationship Between Short-Term Uses and Long-term Productivity

Neither the Proposed Action nor Alternative 1 would affect the short-term use of commodity-type resources. However, the adverse effects of noxious weed expansion, which would be most likely to occur under the No Action Alternative and Alternative 2, were described for a number of biological and physical resources on the S-CNF previously in this chapter. Related adverse effects on human and socioeconomic resources, including a broad range of commercial and recreational uses that occur on the S-CNF and that support businesses adjacent to the S-CNF, could also result from poor S-CNF health. The Forest Service (1999a) concluded that, for the FCRONRW, the more effective an alternative is at controlling the spread of noxious weeds, the better that alternative is at protecting the natural resources of an area—despite potential minor, short-term impacts on the environment. That same conclusion applies to the S-CNF.

4.K. Irreversible and Irretrievable Commitment of Resources

Implementation of the Proposed Action, Alternatives 1 and 2, and the No Action Alternative would each involve an irretrievable commitment of labor, fossil fuels, and economic

resources to varying degrees. The expected continued expansion of noxious weeds on the S-CNF under the No Action Alternative (No Change from Current Management) and Alternative 2 may irretrievably reduce or eliminate existing plant diversity and associated resource values, including overall ecosystem function.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Biological Resources				
Vegetation Resources and Noxious Weeds	Noxious weeds negatively impact the natural plant communities they invade by reducing plant diversity and species richness, by decreasing the quality of habitat values for wildlife, and by overwhelming sensitive plant populations. Noxious weeds would continue to displace native vegetation at the same or higher rates than currently.	Would use a blend of weed treatment methods and site restoration, designed to aggressively eradicate, control, and contain weeds and to restore areas (where appropriate) following treatment. Expected beneficial effects are: 1) improve and increase the biodiversity of native vegetation, 2) improve quality habitat for wildlife, and 3) protect the integrity of ecological sites for sensitive plant species. Aerial treatment is used to control and eradicate very large infestations in isolated areas with steep slopes and rocky soils.	Benefits described for the Proposed Action could still be achieved, but it would take much longer. The further spread of noxious weeds would be controlled, but little would be done to eradicate large infestations currently in place. There would need to be constant efforts to control the spread of weeds from current sites.	Alternative 2 may, with a large, constant labor outlay, control the further spread of noxious weeds. The reduction in size or elimination of current weed sites would likely not occur and it would take much longer than the Proposed Action, Alternative 1, or the No Action Alternative to see any positive results. No herbicide use would mean there is no possibility of inadvertently impacting native vegetation, wildlife habitat, or sensitive plants from chemical drift.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Aquatic Resources	Increased potential for soil erosion and stream sedimentation at weed-infested sites would continue. This can adversely affect aquatic habitat and associated fish and aquatic invertebrate populations.	Treating and reclaiming weed-infested areas would result in improved aquatic and riparian habitat conditions and reduced threats to all aquatic species. Four worst-case situations involving the use of herbicides include the inadvertent entry of herbicides into aquatic ecosystems through surface runoff, leaching through soils, accidental spills, and wind drift. BMPs and mitigation measures would avoid or minimize these effects.	Similar to the Proposed Action, except that no aerial application of herbicides would take place, making it a less aggressive weed treatment alternative than the Proposed Action. This decreases the chance for wind drift into aquatic systems during application, but increases the time before weeds are eradicated, contained, or controlled and habitat is restored.	Benefits to aquatic resources under Alternative 2 would be less than those for the Proposed Action, Alternative 1, or the No Action Alternative. It would take longer to realize some limited benefits to aquatic and riparian resources resulting from reduced erosion and sediment delivery at successfully treated weed-infested sites to drainages. The increased use of mechanical treatments would result in increased surface disturbance potentially increasing sediment delivery to streams. There would be no potential for any of the worst-case situations involving herbicide application.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Wildlife Resources	All wildlife species would be affected to varying degrees from weed expansion. As weeds expand they displace native plant communities; reduce hiding cover, which may cause smaller wildlife species to abandon an area, in turn displacing predators; and reduce forage on big game winter range. Long-term threats to wildlife would be moderate to high.	Minimal impacts from weed control activities are expected to any wildlife species. Short-term disturbance and displacement is expected during treatment applications; usually less than 1 day. Long-term benefits to all wildlife species would be high as native plant communities are restored following weed treatment.	Long-term benefits to wildlife would be moderate and less than the Proposed Action, and would occur at a slower rate because of no aerial application of herbicides under Alternative 1.	Long-term threats to wildlife would generally be high. Infestations would continue to expand, since this alternative incorporates relatively non-aggressive treatment technologies. The result would be a reduction in available forage for wildlife. Additionally, it would take a longer period of time to achieve the same or lesser levels of weed control than could be achieved using herbicides; rapidly expanding infestations would likely continue to increase in size. Therefore, it would take longer to realize any benefits to wildlife from the control and eradication of weeds.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Ecosystem Function	Ecosystem function would experience little to no impact from treatment of noxious weeds, but ecosystem function would be adversely affected by continued weed population expansion.	Impacts would be less under the Proposed Action than the No Action Alternative. Weeds would be aggressively eradicated, controlled, or contained using a variety of methods, and treatment sites would be restored to native vegetation. Loss of native plant communities would decrease over time as weeds are reduced and eliminated. Long-term eradication in steep and rocky terrain would be most effective with aerial application.	Effects on ecosystem function would generally be similar to those described for the Proposed Action, but would occur at a slower pace because of no aerial herbicide application under Alternative 1. Treatment success and improvements to ecosystem function on infested steep slopes or inaccessible areas would not be as effective or as widespread as under the Proposed Action. Earlier efforts on this terrain have only been marginally successful. There would be negative effects on these areas (e.g., infestations would increase) because these methods alone cannot be effectively used on this terrain.	Direct and indirect adverse effects on ecosystem function would be greater than those described for the Proposed Action, Alternative 1, and the No Action Alternative. The timeframe for implementation and any visible treatment success would be longer, but there would be no risk from herbicide application. Indirect adverse effects would include continued expansion of infestations, especially in steep and rocky terrain where mechanical methods cannot be used.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Physical Resources				
Surface Water	Although increased runoff from weed-infested sites may result in local, short-term variations in a stream's hydrograph, this would not be expected to alter a drainage's seasonal flow regime. The existing use of herbicides would continue at the current rate, limited monitoring indicates these activities have not impacted surface water quality, hydrology, 303(d)-designated water bodies, or designated beneficial uses.	Effects of weed treatment under the Proposed Action would be expected to result in some improvement in surface water quality. Potential short-term impacts on surface water quality could occur if there were an accidental spill of a relatively toxic herbicide in a small drainage. Adherence to BMPs and mitigation measures would reduce the likelihood of such a spill occurring. Aerial applications also would help minimize the threat of spills at or near treatment areas.	Effects on surface water would generally be similar to those effects described for the Proposed Action, except there would be no aerial application of herbicides. Benefits to surface water quality resulting from reductions in erosion and sediment delivery from weed-infested areas would still be expected, but they would take longer to achieve and be less widespread than under the Proposed Action.	The magnitude of direct and indirect benefits to surface water quality would be expected to be less than those for the Proposed Action, Alternative 1, or the No Action Alternative. It also would take longer to realize any benefits to surface water quality resulting from reduced erosion and sediment delivery at weed-infested sites to drainages.
Groundwater	The No Action Alternative would not affect groundwater resources or drinking water quality.	If the worst-case situation involving leaching of herbicides that was discussed did occur, it would have a very minor or negligible effect on groundwater quality and would not be expected to result in violations of drinking water standards.	The potential effect of Alternative 1 on groundwater resources would be the same as described for the Proposed Action.	Alternative 2 would not affect groundwater resources or drinking water quality.
Soils, Geology, and Minerals	Soils, geology, and minerals would experience little to no impact from treatment of noxious weeds, but soil stability and productivity would be affected by weed population expansion.	Declines in soil productivity would diminish with the Proposed Action as native plant communities become established on eradicated weed sites and restore the nutrient and organic matter balance over time.	There would be long-term benefits to soils from the reduction in size of weed populations and subsequent reduction in erosion. Similar to the Proposed Action, Alternative 1 would not affect geology and minerals.	It would take longer to realize any benefits to soils from the control and eradication of weeds. Alternative 2 would not affect geology and minerals. Eradication or control of larger infestations would not occur, thus leaving soils in jeopardy of continued degradation.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Land Uses and Designations	Invasive weeds would continue to affect commercial and recreational values on the S-CNF—and in the communities that rely on a healthy forest ecosystem. There would be a high threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	Commercial and recreational activities may be affected as access to infested areas is restricted during spraying and other weed treatments. However, the Proposed Action would eradicate some weed populations, and would effectively reduce the size and rate of spread of other infestations, which ultimately benefits land use. There would be a low threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	Because this alternative would not incorporate aerial spraying activities, large weed infestations on steep, inaccessible slopes of the S-CNF would be more difficult to control. This could lead to expansion of infestations and some additional loss of wildland acres. This would also affect recreational and commercial uses, since weed control activities would take longer and be less effective in that area. There would be a moderate threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.	While this alternative offers a full array of non-chemical weed treatment methods, it is anticipated that treatment would take longer and be less effective than the Proposed Action, Alternative 1, or the No Action Alternative. Commercial and recreational opportunities would be affected, since weed infestations would remain, and likely expand, as non-chemical treatments are implemented. There would be a high threat of weed encroachment into roadless areas and risk of impacts to RNA and WSR characteristics.
Visual Resources	Noxious weed populations primarily affect views of the immediate foreground and middle ground, rather than the background, except where plant infestations are large enough to impact views of hillsides. The opportunity to view native vegetation and wildlife would be reduced.	Visual quality in treated areas would improve. During treatment, however, visual opportunities may be temporarily diminished as weed populations die and natural vegetation is restored and recovers. This effect is expected to be short-lived, and would be most apparent where there are large weed infestations.	The visual impact would be most apparent where large infestations of weeds occur on steep slopes. Ground application of herbicides may have some long-term effects on weed infestations, but control and eradication goals may not be met, with a corresponding effect on visual opportunities. As a result, the vistas of these steep, often inaccessible slopes would be marred by weeds indefinitely.	Some loss of additional opportunities for viewing the natural landscape would occur as non-chemical treatments take time to implement. Other large weed infestations could also expand, since most weed types do not immediately respond to non-chemical treatment. Continued, permanent loss of opportunities may occur as weed infestations begin to spread beyond the capacity to manage expansion and new growth.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Air Quality and Noise	The only effects on air quality would be potential drift from herbicide spraying and some dust from mechanical treatment. Spot spraying would result in little drift. The odor of the chemicals may persist for several hours. Other effects on air quality would include dust from weed control efforts. The only short-term effect on noise levels would be from localized mechanical treatments such as mowing and mulching.	Weed treatments would have the same impacts as described for the No Action Alternative. Since the Proposed Action would provide for the greatest level of weed control, it would contribute the greatest reduction in the amount of airborne weed pollen present in the affected area. The short-term effects on noise levels would stem from aerial herbicide application and mechanical operations.	The direct effects on air quality of Alternative 1 would be virtually identical to those of the Proposed Action, although the short-term risk of drift from aerial spraying would be removed. Overhead noise from aerial herbicide applications would not occur, thus decreasing the impact on noise levels from weed treatments.	Short-term effects on air quality from herbicides would not occur. Beneficial effects of reduced weed pollen on any particular site would occur if weeds are reduced on that site. Individually, these effects may be too small to benefit local air quality. Extensive mechanical weed treatments may cause short-term effects on dust and noise levels within the areas of treatment.
Human and Socioeconomic Resources				
Human Health and Safety	Noxious weeds do not pose a human health and safety risk, except from minor cuts and scrapes and skin irritation from contact with weeds, and allergies from weed pollen. Current ground-based herbicide spraying has not impacted public health and safety and is not expected to cause an impact.	Workers are at risk from cuts, scratches, and skin irritation, and sprains and strains from working on uneven ground. Toxicity studies indicated that worker risks from herbicides would be extremely low. Safety protocols would minimize or eliminate this risk. Risks to the public while collecting wild edible vegetation are virtually non-existent.	Effects would be similar to the Proposed Action, except that the risk of herbicide drift would be reduced because aerial spraying would not be used. Treating steep, inaccessible areas with ground-based treatments increases the risk of worker injury.	Risks from herbicide application would be completely eliminated. However, workers would still be subject to potential sprains, strains, cuts, scratches, and skin irritation from contact with weeds. Increased mechanical treatments increase the risk of injury substantially, especially on steep slopes.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Indian Trust Assets/Treaty Rights	The spread of weeds would likely continue to displace and adversely affect native vegetation gathered by local Tribes. The traditional use of these plants would be further affected as access is affected by continued weed control efforts. Other Trust Assets that could also be directly affected are resident and anadromous fisheries and their habitat, which may experience degradation from increased sediment delivery to streams from weed infestations.	Biological and physical resources would benefit overall, as described above. However, there may be short-term adverse effects from herbicide odor and drift to non-target areas during aerial spraying. Other adverse, short-term effects may stem from chemical odors and drift as ground-based herbicides are applied and from disturbance of resources during mechanical treatment. The cultural gathering of plants may be affected, but only for a short time during treatment. Direct adverse impacts to terrestrial and aquatic habitats and species is expected to be none or minimal. With reduced weed infestations, long term indirect beneficial effects to these habitats is expected benefiting Tribal Treaty Rights.	This alternative would be identical to the Proposed Action, except no aerial herbicide application would occur. The experience of Native Americans using Trust Assets may be affected if the users know that weed control treatments are occurring nearby, or if access to these assets is restricted during and perhaps briefly following treatment. Long-term access to Trust Assets could be affected as weed eradication would take longer to perform under this alternative. Long term beneficial effects to terrestrial and aquatic habitats would be less than the Proposed Action due to less effective treatment options, potentially affecting long term Trust Assets and Treaty Rights.	This alternative would not incorporate herbicide applications, thus eliminating any potential risks of drift or chemical odor. However, this alternative may have a direct effect on weed control and expansion since the range of treatments would be limited, resulting in limited success and benefits compared to the Proposed Action, Alternative 1, and the No Action Alternative. Native American long-term access to Trust Assets would be affected by continued weed expansion expected under this alternative. In addition, with the continued weed expansion, long term effects to terrestrial and aquatic habitats would likely be significant, adversely affecting Trust Assets and Treaty Rights.
Environmental Justice	The No Action Alternative would not alter subsistence rights and fishing by Native American Tribes, and would not disproportionately impact minority and low-income populations.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Economics	Adjacent communities would share the economic impact of losses from weed infestations since these communities rely on the forest resources for their livelihood. Effects on vegetation, fisheries, wildlife, and ecosystem function would also influence the economic well-being of these adjacent communities. The land itself has value, the loss of which represents an important economic impact. A conservative estimate of the wildland acreage is approximately $3.95 per acre, with rangeland values at $10.73 per acre. The estimated cost of treating 3,500 acres annually under this alternative is approximately $843,000 ($241 per acre).	Given the economic cost of the No Action Alternative, a direct effect would be in savings of wildland and rangeland acres. A conservative estimate would include the savings of currently infested wildland acreage of approximately $3.95 per acre, with rangeland values of $10.73 per acre. The estimated cost of treating 18,000 acres annually under this alternative is approximately $3,020,000 ($168 per acre).	The economic effects stemming from the cost of this alternative would be essentially the same as the Proposed Action, except the cost of aerial herbicide application would not be included. There would be less acreage affected by wildland and rangeland acreage savings (approximately $3.95 per acre and $10.73 per acre, respectively) with this alternative since treatment in steep, rough terrain would be difficult. The estimated cost of treating 18,000 acres annually under this alternative is approximately $6,850,000 ($381 per acre).	Alternative 2 would consist of non-chemical weed treatment methods. These techniques take time and can be labor intensive, thus increasing the potential long-term costs of this alternative. Wildland and rangeland acreage savings (approximately $3.95 per acre and $10.73 per acre, respectively) would not be realized as non-chemical eradication efforts may not keep pace with infestations. The estimated cost of treating 18,000 acres annually under this alternative is approximately $16,370,000 ($909 per acre)

TABLE 4-8
Comparison of Effects Between Alternatives

Resource Area	No Action Alternative	Proposed Action	Alternative 1	Alternative 2
Cultural Resources				
Cultural and Historical Resources and Native American Religious Concerns	The spread of weeds would likely continue to displace native vegetation gathered by local Tribes. The traditional use of these plants would be affected as access is affected by continued weed control efforts. The continued presence of noxious weeds along the Lewis and Clark Trail could result in a reduction of the historical integrity of trail and camping sites.	Offers the greatest recovery potential for currently infested historic landscapes while having a minimal effect on cultural and historic values. Access to important cultural sites may be temporarily restricted during weed treatment efforts. Native American users' experiences in culturally important or sacred sites may be affected as the users become aware of ongoing treatment activities.	Similar to the Proposed Action.	Similar to Alternative 1. However, large weed infestations may take longer to treat under this method, since the aerial application of herbicide has been shown to be the quickest method of weed treatment. The potential for disturbing cultural resources would be greatest under this alternative because of the planned extensive use of mechanical treatments.
Paleontological Resources	No effects are anticipated from the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.

Chapter 5. Consultation and Coordination

5.A. Introduction

To meet the needs of the public and regulatory stakeholders with interests in the S-CNF Noxious Weed Management Program EIS, efforts have been made to provide information to the public, federal, state, tribal, and local agencies.

This EIS is a visible project that elicits comments from many governmental representatives and concerned citizens. As part of the scoping process, materials and services were provided to facilitate the public review and comment process. All public comments during scoping and during review of the Draft EIS have been documented per NEPA guidance and are included in this Final EIS.

5.B. Public Scoping Process

As required under NEPA, the public was invited to attend and participate in three scoping meetings held in Arco, Challis, and Salmon, Idaho. The S-CNF sought information, comments, and assistance from federal, tribal, state, and local agencies, and from other groups and individuals interested in or affected by the proposed project. These subjects are described in detail in *Chapter 2, Alternatives;* in *Section 2.B.2, Public Involvement; Section 2.B.3, Public Responses and Concerns*; and *Section 2.B.4, Issues.* They are briefly addressed below.

5.B.1. Notice of Intent (NOI)

The formal scoping period opened with publication of the NOI to produce an EIS, which appeared in the Federal Register on December 14, 2001. As shown in Figure 5-1, the NOI is the first step in the development process of the Final EIS.

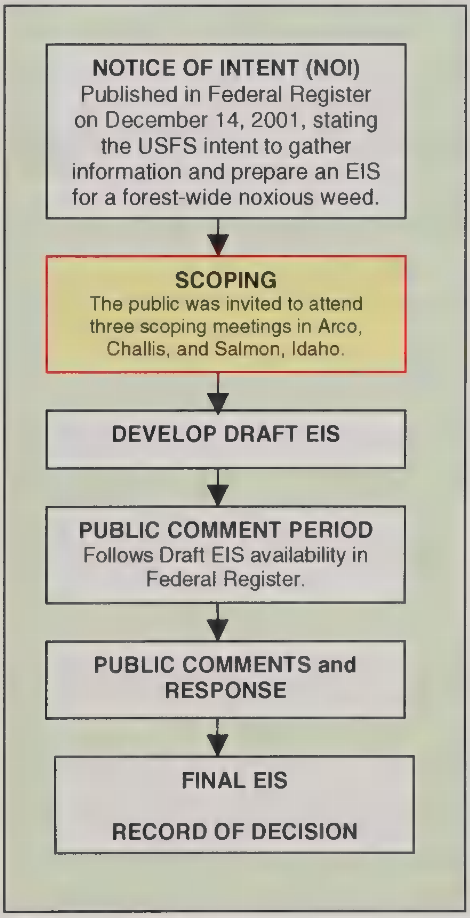


Figure 5-1 EIS Process

5.B.2. The Scoping Process

The scoping process included: 1) identification of potential issues, 2) identification of issues to be analyzed in depth, 3) identification of alternatives, and 4) elimination of non-significant issues or those that have been covered by previous environmental reviews.

5.B.3. Scoping Meetings

Along with the NOI printed in the Federal Register, the public scoping meetings were advertised by the Forest Service through media as follows:

- The Arco Advertiser
- The Challis Messenger
- The Salmon Recorder Herald
- KSRA (Salmon Radio Station)
- NEPA mailing sent to 502 interested individuals

The first public meeting was held in Arco, Idaho, on Tuesday, January 8, 2002, at 7:00 p.m. at the Business Incubation Center. The second meeting was held in Challis, Idaho, on Wednesday, January 9, 2002, at 6:00 p.m. at the Middle School cafeteria. The final meeting was held in Salmon, Idaho, on Thursday, January 10, 2002, at 6:00 p.m. at the S-CNF Headquarters Office. The facilitated sessions were attended by a total of 10 members of the public who desired that their opinions be set forth and considered. Comments were collected from all meeting sites and analyzed along with all letters, phone calls, and other comments received by the S-CNF during the scoping period.

5.B.4. Issues that Emerged from the Scoping Process

To assist the S-CNF in identifying and considering issues and concerns on the proposed project, a total of 88 written comments from 25 individuals or organizations were received as a result of public scoping. A summary of the public scoping comments is attached in Appendix K and discussed in *Section 2.B.3, Public Responses and Comments,* in Chapter 2.

The Interdisciplinary (ID) Team reviewed potential issues and categorized those relevant to the proposed project. The S-CNF Decision Officer reviewed the team's recommendations and decided which issues were key to the proposal. The team met numerous times to analyze and develop issues into statements and determine measures to evaluate the consequences. *Section 2.B.4, Issues,* in Chapter 2 summarizes issues that were identified.

5.C. Consultation and Coordination During EIS Preparation

5.C.1. Endangered Species Act Consultation

Under provisions of the ESA, federal agencies are directed to seek to conserve endangered and threatened species, and to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats.

On May 30, 2003, the USFWS provided the S-CNF a consultation letter on the proposed project and information on endangered and threatened species (Species List 1-4-03-SP-629) (see Appendix G). Previous consultation letters from the USFWS dated January 25, 2002, September 3, 2002, October 18, 2002, December 4, 2002, and February 26, 2003, also were received on the proposed project (see Appendix G). Consultation has also occurred with the Shoshone-Bannock Tribes and with the National Marine Fisheries Service (NMFS) regarding anadromous fish species. The Shoshone-Bannock Tribes were sent a government-to-government letter on January 15, 2002, describing the proposed project and requesting

5.C.2. Tribal Consultation

Administration of Indian Trust Assets is the responsibility of the federal government. The Shoshone-Bannock Tribes were sent a notice letter on January 15, 2002, describing the proposed project and requesting input. The Draft EIS was also sent to the Tribes in November 2002 seeking review and comment. Forest Service EIS project team personnel met with the Tribe's resource technical staff for an information meeting in August 2003 and also September 2003 to discuss and clarify Tribal issues and concerns. This ongoing coordination with the Shoshone-Bannock Tribes has identified important issues that may potentially be affected by weed management efforts. S-CNF personnel will continue to consult with the Shoshone-Bannock Tribes, and other Tribes that may have assets within the S-CNF, during the implementation of the selected alternative.

5.D. Draft Environmental Impact Statement

5.D.1. Development and Distribution of the Draft EIS

The Draft EIS was developed from issues raised during the scoping meetings, consultation with other agencies, and development of alternatives by the ID Team. Public distribution of the Draft EIS for review and comment began with a Notice of Availability published in the Federal Register on November 15, 2002. Additional notices were published in the Challis Messenger, the Arco Advertiser, and the Salmon Recorder-Herald during the week of November 10, 2002. The Draft EIS was sent to the members of the public and other individuals who attended public meetings and/or requested a copy of the Draft EIS. It was also made available on the S-CNF web site (www.fs.fed.gov/r4/sc). A hard copy and compact disc version of the Draft EIS were made available for public review at the Forest Service Office in Salmon, Idaho.

A complete mailing list of all parties who received a copy of the Draft EIS is available from S-CNF Headquarters in Salmon, Idaho.

5.D.2. Public Meetings on the Draft EIS

Three public meetings were held during December 2002 to receive comments on the Draft EIS:

- Arco, Idaho, on December 10, 2002, 6:00 p.m., at the "Business Incubation Center." Two individuals attended.
- Challis, Idaho, on December 11, 2002, 6:00 p.m., at the Forest Service Office on Highway 93. Two individuals attended.
- Salmon, Idaho, on December 12, 2002, 6:00 p.m., at the Forest Service Headquarters on Highway 93. Three individuals attended.

Notices of these meetings were published in local newspapers and on the S-CNF web site. The meetings were conducted as informal informational meetings, with information on the Draft EIS available. Officials from the Forest Service were available to answer questions. Comment forms were available at each meeting. One individual filled out a comment form

in support of the Proposed Action. No other comment forms were received at the public meetings.

5.D.3. Public Comments on the Draft EIS and Methods of Evaluation

All notices of availability of the Draft EIS announced a 60-day public comment period, which closed on January 14, 2003. Comments were received in the form of written letters (11), e-mail messages (2), and comment forms from public meetings (1, as described above). Comments received after the close of the comment period were also reviewed and responded to accordingly. Reviewers of this document are encouraged to review other comments and responses presented in this Final EIS.

The Forest Service's NEPA handbook (40 CFR1503.4) gives direction on what to do with comments received on a Draft EIS. The ID Team is to review, analyze, evaluate, and respond to substantive comments on the Draft EIS. All comment letters were reviewed, in full, by the ID Team. The ID Team then analyzed each comment for content, and evaluated whether the statement/question was indeed a substantive comment or an opinion. Substantive comments and responses were divided into five general categories as identified in the FS 1905.15 handbook. They are discussed in the following paragraphs.

a. Modify Alternatives Including the Proposed Action

Although some comments questioned the similarity between the alternatives, no comments suggested changes to the alternatives or the Proposed Action.

b. Develop and Evaluate Alternatives not Previously Given Serious Consideration by the Agency

Some comments suggested considering additional alternatives, and several responses were developed describing the rationale for their dismissal.

c. Supplement, Improve, or Modify Its Analyses

Several comments suggested that we supplement the analysis of herbicide effects on wildlife, particularly amphibians. In addition, some commenters asked us to consider the effects of endocrine disrupting compounds (EDCs) on wildlife. Other commenters suggested we improve our analysis of the proposed action's effect on wildlife. We considered these comments and revised the Final EIS accordingly by including a review of herbicide impact on amphibians, as well as a discussion of EDCs and their potential adverse effects. Additionally, we reviewed and revised the tables that describe the impacts of the actions on various wildlife families and their habitat. We made other improvements as noted in the comment responses.

d. Make Factual Corrections

Several comments corrected factual material. Those comments were considered substantive. Where necessary, the Final EIS text was revised to correct factual errors.

e. Explain Why the Comments Do Not Warrant Further Agency Response

Some comments came to us in the form of questions. Normally, questions are not considered substantive comments in the Forest Service's NEPA handbook. However, we

answered questions when we could see a substantive concern, and when a response to the question would clearly enhance the content of the Final EIS.

Other commenters stated general, and unsupported, opinions about our analysis and the alternatives. We did not consider these opinions substantive comments. The opinions were noted, but no text was changed nor was a response developed.

5.D.4. Response Development

The first step in responding to public comments was to identify comments and assign comment numbers to the individual remarks in each piece of correspondence. A total of 272 individual comments were reviewed. Next, the ID Team wrote a response to each identified comment. Often, commenters shared the same concern about an issue. Where this occurred, the ID Team generally referenced the first comment and response where the concern was raised. Finally, the comment letters and the responses were compiled into Appendix M. Individuals, agencies, and interest groups who commented on the Draft EIS are listed in Table M-1 of Appendix M.

Each page of each comment letter is reproduced in Appendix M. The letter number and comment number (**1.1**), with a vertical line adjacent to the text, indicate what was considered a comment that needed a written response. The comment number appears directly beside the S-CNF response on the facing page. All comments received are important, although many do not need a response. For example, a comment was made "I would like to go on record as being very supportive of the Proposed Action…" and another one said "Risk assessment is an inherently undemocratic process…." These comments are important to the decision maker and are considered when making the final decision, yet the ID Team did not consider that written responses were necessary in such instances.

The full text of the comments and responses is provided in Appendix M of this Final EIS.

5.E. Final Environmental Impact Statement and Record of Decision

5.E.1. Development and Distribution of the Final EIS

This Final EIS was developed by incorporating and reviewing comments from the public and responses to those comments prepared by the ID Team. Some comments generated the text revisions that have been included in the body of this Final EIS. Responses to comments in Appendix M note where such text changes have been made, generally to provide additional information or to clarify discussions of project area resources and potential project effects. All issues raised during the official comment period were reviewed by the ID Team, which then generated the responses shown in Appendix M.

This Final EIS was distributed upon publication of a Notice of Availability in the Federal Register, additional notices published in local news outlets, and placement on the S-CNF web site. Notices were also mailed to commenters and others who requested information about the Final EIS. A hard copy and a compact disc of the Final EIS were also made available for public review at Forest Service Headquarters in Salmon, Idaho. A complete

mailing list of all parties who received a copy of this Final EIS is available from S-CNF Headquarters.

5.E.2. Development of the Record of Decision

The ROD will describe the alternative selected for implementation and its potential project effects. When the ROD becomes available, a notice will be placed in the same news outlets previously used in this process for the Draft and Final EISs, and it will also be available on the S-CNF web site. The ROD will be distributed to all who request a copy. The ROD is the final document in the EIS process.

Chapter 6. Glossary

Definitions are derived from various sources as indicated in the *Sources* list at the end of the Glossary, or formulated uniquely for this project.

Term	Definition
A	
Aesthetic quality	A perception of the beauty of a natural or cultural landscape.
Affected environment	Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.
Air quality	Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.
Allelopathic	The release into the environment by one plant of a substance that inhibits the germination or growth of other potential competitor plants of the same or another species.
Anadromous	Used to describe fish (such as salmon and steelhead) that return from the sea to the rivers where they were born in order to breed.
Animal Unit Months	The amount of dry forage required by one animal unit for one month based on a forage allowance of 26 pounds per day (Society for Range Management 1989).
Annual	A plant that flowers, produces seed, and dies in one growing season.
Aquifer	A geological formation or structure that stores and/or transmits water, such as to wells and springs.
Archaeologist	A scientist who studies past human life through material remains.
B	
Benchland	A long, narrow, relatively level terrace or platform breaking the continuity of a slope. In canyons, these landforms are often the result of old stream terraces above the present elevation.

Term	Definition
Beneficial uses	One of several uses of streams and lakes that may include drinking, fish habitat, and recreation. This phrase has a specific technical connotation because the federal Clean Water Act requires states to adopt standards and procedures that protect designated beneficial uses of public waters.
Best management practice	A practice or combination of practices determined by a state or an agency to be the most effective and practical means (technological, economic, and institutional) of controlling point and nonpoint source pollutants at levels compatible with environmental quality.
Biennial	A term used to describe a plant that lives for 2 years, and produces flowers and fruit in the second year.
Bioaccumulate	The accumulation of a harmful substance such as a radioactive element, a heavy metal, or an organochlorine in a biological organism, especially one that forms part of the food chain.
Biological control	A method of reducing or eliminating plant pests by introducing predators or microorganisms that attack the targeted pests but spare other species in the area.
Biodiversity	The range of organisms present in a given ecological community or system, which can be measured by the numbers and types of different species, or the genetic variations within and among species.
Biomagnify	To undergo biological magnification.
Biota	The types of plant and animal life found in specific regions at specific times.
Broadleaf	A term used to describe trees that have wide leaves rather than leaves that are thin, like (pine) needles.
Buffer	A vegetation strip or management zone of varying size, shape, and character maintained along a stream, lake, road, recreation site, or different vegetation zone to mitigate the impacts of actions on adjacent lands, to enhance aesthetic values, or as a best management practice.
C	
Calcareous	Plant matter growing on limestone or in earth containing limestone.

Term	Definition
Candidate species	A state and federal designation. State candidate species are those that will be reviewed for possible listing as endangered, threatened, or sensitive. Species for which there is substantial information to support listing the species as threatened or endangered; listing proposals are either being prepared or are delayed by work on higher priority species.
Colonizer	A plant that is established or becomes established in a biological colony in a new ecosystem.
Conifer	Any tree that has thin leaves (needles) and produces cones. Many types are evergreen.
Consumptive use	That part of water withdrawn that is evaporated, transpired by plants, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment. Also referred to as water consumed.
Contiguous	Touching or connected throughout in an unbroken sequence.
Critical habitat	**State:** Habitats of threatened or endangered species as designated by various state forest practices boards. **Federal:** Areas designated under the federal ESA that meet these criteria: 1. Areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection. 2. Areas outside the geographic area occupied by a listed species, when it is determined that such areas are essential for the conservation of the species.
Cultural resources	Sites, structures, landscapes, and objects of some importance to a culture or community for scientific, traditional, religious, or other reasons.
Cumulative impact	The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions—regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7).

Term	Definition
D	
Discharge	The volume of water that passes a given location within a given period of time. Usually expressed in cubic feet per second (cfs).
Diversity	see *Biodiversity*.
Dolomitic	A white, reddish, or greenish mineral consisting of calcium magnesium carbonate, found in sedimentary rocks. It is used as a building stone and in the manufacture of cement and fertilizers.
E	
Ecosystem	The complex of a community of organisms and its environment functioning as an ecological unit.
Endangered species	Any species in danger of extinction throughout all or a significant portion of its range.
Endemic	Plants or animals that are native to a particular region or country.
Environment	The surrounding conditions, influences, or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.
Environmental Impact Statement	A formal public document prepared to analyze the impacts on the environment of the proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.
Ephemeral	A plant (or insect) that lives for only a short period of time.
Exotic	In ecology, a term that describes the introduction of a species from another place or region.
Extirpate	To destroy completely; wipe out.
F	
Fallow	Allowing cropland, either tilled or untilled, to lie idle during the whole or greater portion of the growing season.
Fauna	The wildlife or animals of a specified region or time.
Federally listed	Species formally listed as a threatened or endangered species under the ESA. Designations are made by the FWS or NMFS.
Floodplain	The lowland that borders a stream or river, usually dry but subject to flooding.

Term	Definition
Flora	Plant life, especially all the plants found in a particular country, region, or time regarded as a group. Also, a systematic set of descriptions of all the plants of a particular place or time.
Forage	Food for animals. In this document, term applies to both availability of plant material for wildlife and crops grown to feed horses, cattle, and other livestock.
Freshwater	Water that contains less than 1,000 milligrams per liter (mg/L) of dissolved solids; generally, more than 500 mg/L of dissolved solids is undesirable for drinking and many industrial uses.
G	
Genetic introgression	Reproductive crosses between species that result in a sterile hybrid (such as brook trout/bull trout hybrids), as well as crosses between species that result in changes to the gene pool of one species (such as cutthroat/rainbow hybrids or introduction of genetic material from hatchery fish).
Geographic information system (GIS)	A computer system that stores and manipulates spatial data, and can produce a variety of maps and analyses. GISs are used to set landscape-level planning objectives. GISs can do the following: 1. Assign information and attributes to polygons and lines, which represent relationships on the ground. 2. Update and retrieve inventory, mapping, and statistical information.
Granitic	A term used to describe something composed of a coarse-grained igneous rock made up of feldspar, mica, and at least 20 percent quartz.
Grassland	An area covered with grass and grass-like vegetation.
H	
Habitat	The region where a plant or animal naturally grows or lives. A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and home range.
Half-life	The time required for half of something to undergo a process. As used in this document, it is the amount of time for half the herbicide to break down, becoming ineffective.

Term	Definition
Harm	Habitat modification or degradation that injures or kills wildlife by significantly impairing essential behavioral patterns that include breeding, feeding, or sheltering.
Herbicide	A chemical preparation designed to kill plants, especially weeds, or to otherwise inhibit their growth.
Holistic	An approach to ecology emphasizing the importance of the whole and the interdependence of its parts.
Hydrologic cycle	The sequence of conditions through which water passes from vapor in the atmosphere through precipitation upon land or water surfaces, and ultimately, back into the atmosphere as a result of evaporation and transpiration.
Hydrology	The science that studies the properties, distribution, and circulation of natural surface water and groundwater.
Hyporheic zone	The groundwater under a stream channel or floodplain that contributes water to the stream. Also contributes biologically, sometimes supporting an extensive biotic community.
I	
Impact	A modification in the status of the environment brought about by a proposed action.
Infestation	To overrun a place in large numbers and become threatening, harmful, or unpleasant.
Infiltration	To cause (as a liquid) to permeate something by penetrating its pores or interstices.
Insoluble	Incapable of being dissolved in a liquid.
Integrated Weed Management	An interdisciplinary pest management approach for selecting methods for preventing, containing, and controlling noxious weeds in coordination with other resource management activities to achieve optimum management goals and objectives.
Invader	To become established and spread rapidly in an area, crowding out any preexisting plants.
K	
Koc	The partitioning of a chemical between soil or sediment, usually expressed as K (the concentration of a chemical in soil (ug/g) to that in water (ug/ml)) or as Koc (which is K divided by the organic carbon content of the soil or sediment). The higher the number, the more binding the herbicide is to soil particles.

Term	Definition
L	
Landform	A term used to describe the many types of land surfaces that exist as a result of geologic activity and weathering (for example, plateaus, mountains, plains, and valleys).
LC50	Lethal concentration at which 50 percent of test organisms perish.
LD50	Lethal dose at which 50 percent of test organisms perish.
Leaching	To dissolve out soluble constituents from soil by percolation.
Lek	An assembly area where animals carry on display and courtship behavior.
M	
Minimum tool	Use of a weed treatment alternative that would accomplish management objectives and have the least impact on resources.
Mitigate	To alleviate, reduce, or render less intense or severe.
Mitigation	Action taken to avoid, reduce the severity of, or eliminate an adverse impact.
Mobility	Of or relating to the capability of moving or being moved.
N	
National Environmental Policy Act (NEPA) of 1969	Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.
National Marine Fisheries Service (NMFS)	The federal agency that is the listing authority for marine mammals and anadromous fish under the ESA.
National Register of Historic Places	A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.
Native vegetation	Vegetation originating in a certain region or country.
Naturalization	To cause a plant or animal from another region to become established in a new environment or to adapt successfully to new environmental conditions.
Non-native	A plant that is not growing naturally in a particular place, and that has been introduced by an outside force or agent.

Term	Definition
Noxious weeds	Plants that may cause harm to collectors, or invasive exotics or parasites and their host plants that may harm the ecosystem or agriculture of an area.
P	
Paleontology	A science dealing with the life of past geological periods as known from fossil remains.
Particulate matter	Minute, separate particles, such as dust or other air pollutants.
Perennial	Lasting, or active through the whole year. May refer to rivers, streams, or plants.
Permeability	The measure of the ease with which a fluid can diffuse through a particular porous material.
Policy	A guiding principle upon which is based a specific decision or set of decisions.
Predators	Any organism that exists by preying upon other organisms.
Primitive	An area that is not developed, a pristine natural area.
Programmatic	Of, having, advocating, or following a plan, policy, or program, as in a *Programmatic EIS*.
Q	
Quartzite	A pale, metamorphic (and sometimes sedimentary) rock composed mainly of quartz, formed by the action of heat and pressure on sandstone.
R	
Range	A large, open area of land over which livestock can wander and graze.
Raptor	A bird of prey.
Rare	A plant or animal restricted in distribution. May be locally abundant in a limited area or few in number over a wide area.
Reclamation	Returning disturbed lands to a form and productivity that will be ecologically balanced.
Redd	A spawning nest constructed by a fish. A depression excavated in gravels where eggs are deposited.
Region	A large tract of land generally recognized as having similar character types and physiographic types.

Term	Definition
Residual	Relating to the material left after weathering of a rock and removal of its soluble constituents.
Revegetation	The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as reseeding.
Rhizomes	A thick underground horizontal stem that produces roots and has shoots that develop into new plants.
Right-of-way	Strip of land acquired by legal means, over which utility corridors and access roads pass.
Riparian	Of, or pertaining to, the area surrounding the banks of a stream that supports vegetation dependent on high levels of water.
Riparian area	Areas of land directly influenced by water or that influence water. Riparian areas usually have visible vegetative or physical characteristics reflecting the influence of water. Riversides and lake borders are typical riparian areas.
Road prism	This is the horizontal template of a road that includes the road running surface, cutslope, fillslope, and ditch.
S	
Sacred site	Any specific, discrete, narrowly delineated location on Federal land identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the Tribe or appropriately authoritative representative has informed the agency of the existence of such a site.
Salmonid	Fish species belonging to the family Salmonidae, including trout, steelhead, salmon, char, and whitefish species.
Scoping	The process of determining the range of proposed actions, alternatives, and impacts to be discussed in an EIS; includes public meetings.
Sediment	A generic term used loosely to describe silt or sand-sized particles that may settle out of flowing water onto the bottom of streams and rivers, which may cover gravels otherwise used by salmonid fish for spawning and rearing young. Sediments may also inhibit oxygen uptake by fish eggs and therefore reduce reproductive success.

Term	Definition
Sediment/ Sedimentary	Solid fragmental material, either mineral or organic, that is transported or deposited by air, water, gravity, or ice.
Semi-arid	A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.
Sensitive species	Species whose populations are small and widely dispersed or restricted to a few localities. Species that are listed or candidates for listing by the state or federal government.
Sensitivity	The state of being readily affected by the actions of external influence.
Site	In archaeology, any locale showing evidence of human activity.
Socioeconomic	Of or involving both social and economic factors.
Soluble	Able to be dissolved in another substance, such as water.
Solubility	The quality or state of being soluble. Expressed in this document as the quantity of a herbicide that can be dissolved in water.
Species	A group of individuals of common ancestry that closely resemble each other structurally and physiologically, and in nature interbreed to produce fertile offspring.
Subspecies	Any natural subdivision of a species that exhibits small, but persistent morphological variations from other subdivisions of the same species living in different geographical regions or times.
Subnivian	Under the snow.
Synergistic relationship	The simultaneous action of separate physical factors that when combined have a greater total effect than the sum of their individual effects.
T	
Take	To kill or capture a species covered by the ESA.
Tap-root	A prominent and often bulky root that extends downward below the stem of some plants and has fine lateral roots. It often serves as a food storage organ.
Threatened species	Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.
Topography	The relative positions and elevations of surface features of an area.

Term	Definition
Traditional cultural property	A term referring to a tangible site, district, structure, building, or object with defensible boundaries that is important to a contemporary human community and has been for 50 years or more, that has significance under one or more criteria of the National Register of Historic Places, and with integrity of location, design, setting, materials, workmanship, feeling, and association in the perspective of those who value the place.
Transpiration	The process by which water that is absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface, such as leaf pores.
Tributary	A stream or river that flows into a larger stream or river.
Turbidity	The amount of solid particles that are suspended in water and that cause light rays shining through the water to scatter. Turbidity makes the water cloudy or even opaque in extreme cases.
U	
Upland	Land or an area of land lying above the level where water flows or where flooding occurs. Land that is generally dry, as opposed to lowland, meadow, marsh, swamp, and the like. See *riparian* for comparison.
U.S. Fish and Wildlife Service (USFWS)	The federal agency that is the listing authority for species other than marine mammals and anadromous fish under the ESA.
V	
Vegetation community	Species of plants that commonly live together in the same region or ecotone.
Viable population	A population of sufficient size and distribution to be able to persist for a long period of time in the face of demographic variations, random events that influence the genetic composition of the population, and fluctuations in environmental conditions, including catastrophic events.
Volcanic soils	Soil materials weathered from rocks or material that were produced by volcanic eruptions.
W	
Water Quality Limited Stream	A stream listed under the Clean Water Act as not fully supporting designated beneficial uses. It is for these water bodies that Total Maximum Daily Loads are required to be developed.

Term	Definition
Watershed	The catchment area of land draining into a river, river system, or body of water; the drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.
Wetlands	Lands or areas exhibiting hydric soils, saturated or inundated soil during some portion of the plant growing season, and plant species tolerant of such conditions (includes swamps, marshes, bogs).

Sources

Bureau of Land Management. 1997. Revised Cultural Resource Manuals. http://www.blm.gov/nhp/efoia/wo/fy97/im97-168.html (March 2000).

Infoplease.com. 2002. http://www.infoplease.com/index.html (May 29, 2002).

Merriam Webster's Collegiate Dictionary. 1989. Ninth Edition. Springfield, Massachusetts: Merriam-Webster, Incorporated.

Microsoft Network. 2002. Encarta World English Dictionary. North American Edition. http://dictionary.msn.com (May 29, 2002).

Museum Victoria. 2000 Dinosaur Glossary. http://www.mov.vic.gov.au/dinosaurs/teachgloss.stm (March 2000).

One Look Dictionaries. 2002. Garden Web Glossary of Botanical Terms. http://glossary.gardenweb.com/glossary/nph-ind.cgi?scrug=16677&k=noxious+weeds&b=and&r=whole&s=terms (May 29, 2002).

Society for American Archaeologists. 2000. Teaching Archaeology: Archaeological Terms http://www.saa.org/Publications/Sampler/terms.html (March 2000).

Chapter 7. Acronyms and Abbreviations

Acronym	Definition
A	
ADI	Average Daily Intake
APHIS	Agriculture Animal and Plant Health Inspection Service
ATV	All Terrain Vehicle
AUM	Animal Unit Months
B	
BLM	Bureau of Land Management
BMP	Best Management Practice
C	
CBFWA	Columbia Basin Fish and Wildlife Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
cm	Centimeter
cm/sec	Centimeters per Second
CWMA	Cooperative Weed Management Areas
D	
DEIS	Draft Environmental Impact Statement
E	
EA	Environmental Assessment
EAWS	Ecosystem Analysis at the Watershed Scale
EDC	Endocrine disruption compounds
EFH	Essential Fish Habitat

Acronym	Definition
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ERU	Ecological Reporting Unit
ESU	Evolutionary significant unit
F	
FCRONRW	Frank Church River of No Return Wilderness
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
FQPA	Food Quality Protection Act
FR	Federal Register
FSH	Forest Service Handbook
FSM	Forest Service Manual
G	
GIS	Geographic Information System
GPS	Global Positioning System
H	
HEP	Habitat Evaluation Procedure
HUC	Hydrologic Unit Code
I	
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IDFG	Idaho Department of Fish and Game
INWCC	Idaho Noxious Weed Coordinating Committee
IPM	Integrated Pest Management
IWM	Integrated Weed Management

Acronym	Definition
K	
kg	Kilogram
km	Kilometer (Thousand Meters)
L	
LAU	Lynx Analysis Units
LCAS	Lynx Conservation Assessment Strategy
LC50	Lethal Concentration With 50 Percent Mortality
LD50	Lethal Dose at Which 50 Percent of Test Organisms Perish
LRMP	Land and Resource Management Plan
M	
m	Meter
MATC	Maximum Acceptable Toxicant Concentration
mg	Milligram
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
MIS	Management Indicator Species
ml	Milliliter
mm	Millimeter
mph	Miles per Hour
MVP	Minimum viable populations
N	
NEPA	National Environmental Policy Act
NF	National Forest
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOELs	No-Observed-Effect Levels
NOI	Notice of Intent

Acronym	Definition
NPDES	National Pollutant Discharge Elimination System
NPS	U.S. National Park Service
NRA	National Recreation Area
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O	
OHV	Off-Highway Vehicle
OSHA	Occupational Safety and Health Administration
P	
PAR	Pesticide Application Record
PDEIS	Preliminary Draft Environmental Impact Statement
pH	Numeric Value Indicating the Relative Acidity or Alkalinity of a Substance on a 0 to 14 Scale, with the Neutral Point at 7.0
ppb	Parts per Billion
ppm	Parts per Million
psi	Pounds per Square Inch
PVG	Potential Vegetation Groups
PVT	Potential Vegetation Types
R	
RHCA	Riparian Habitat Conservation Area
RMP	Resource Management Plan
RNA	Research Natural Area
ROD	Record of Decision
ROW	Right-of-Way
S	
S-CNF	Salmon-Challis National Forest
SCS	Soil Conservation Service (U.S.)

Acronym	Definition
SH	State Highway
SHPO	State Historic Preservation Office
SNRA	Sawtooth National Recreation Area
SOP	Standard Operating Procedure
SOPA	Schedule of Proposed Actions
sp.	Species (Used When Species is Unknown or Unspecified)
spp.	Plural of sp. (Multiple Unknown Species)
T	
T&E	Threatened and Endangered
TES	Threatened, Endangered, and Sensitive
U	
USBR	U.S. Bureau of Reclamation
USC	U.S. Code
USCA	U.S. Court of Appeals
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service or Survey
Symbol	
$\mu g/L$	Micrograms per Liter
$\mu g/m^3$	Micrograms per Cubic Meter
μm	One Millionth of a Meter or a Micrometer

Chapter 8. List of Contributors

Name	Degree(s)	Years of Experience
U.S. Forest Service		
Bill Diage	B.S., Soil Science, Minor in Range Science	25
Lucinda Haggas	M.S., Biology-Ecology B.A., Biology	15
Cecilia McNicoll	M.S., Forest Ecology B.S., Wildlife and Range Management	25
Lyle Powers	B.S., Forestry	25
Betsy Rieffenberger	B.S., Water Resources	21
Bob Rose	B.S., Fisheries	17
Glenn Seaberg	B.S., Natural Resources Management	30
Diane Schuldt	B.S., Wildlife Biology	12
Bruce Smith	B.S., Zoology (Fish and Wildlife Management)	30
Dick Ward	B.S., Range Science with Minors in Biology and Animal Science	32
Dick Wenger	M.S., Wildlife Biology B.S., Wildlife Biology	25
CH2M HILL—EIS Preparation Team		
Jen Annen	Undergraduate Studies, Fine Art/Graphic Design	6
Gloria Beattie	B.S., Civil Engineering	15
Charles Blair	M.S., Wildlife Biology B.S., Wildlife Ecology	25
Sara Early	B.S., Geography	8
Jody Fagan	B.A., Fine Arts	25
Judy Ferguson	M.S., Rangeland Ecology B.S., Range Resources B.S., Wildlife Biology	
Lynn Foster	M.S., Fisheries B.S., Biological Sciences	32
Kristie Hicks	B.A., Computer Information Systems	5
Laura Holeman	A.A., Secretarial Science	13
Tamar Jergenson-Cerafici	J.D., Law M.A., English B.A., English	15

Name	Degree(s)	Years of Experience
Amy Lientz	M.S., Industrial Engineering Technology B.S., Environmental Science	15
Dennis Mengel	Doctor Of Philosophy, Soils M.S., Forestry B.S., Wildlife Resources	19
Katie Miller	A.A., Legal Secretarial Services	3
Mike Miller	B.S., Biology	24
Shaun Mulberry	Undergraduate Studies, Business Management	2
Marilyn Paarmann	M.S., Environmental Science B.S., Biological Sciences	15
Michael Schrock	B.A., Geography	20
Brandy Wilson	B.S., English B.S., Geology	8
Jenni York	B.S., General Studies	13

Chapter 9. References

56 FR 58619, National Marine Fisheries Service, "Endangered and Threatened Species; Endangered Status for Snake River Sockeye Salmon," *Federal Register*, Office of Federal Register, November 20, 1991.

57 FR 34953, National Marine Fisheries Service, "Endangered and Threatened Species; Threatened Status for Snake River Spring/Summer Chinook Salmon, Threatened Status for Snake River Fall Chinook Salmon," *Federal Register*, Office of Federal Register, April 22, 1992.

58 FR 68543, National Marine Fisheries Service, "Designated Critical Habitat; Snake River Sockeye Salmon, Snake River Spring/Summer Chinook Salmon, and Snake River Fall Chinook Salmon," *Federal Register*, Office of Federal Register, December 28, 1993.

62 FR 43937, National Marine Fisheries Service, Endangered and Threatened Species: Listing of Several Evolutionary Significant Units (ESUs) of West Coast Steelhead," *Federal Register*, Office of Federal Register, August 18, 1997.

63 FR 31647, U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout," *Federal Register*, Office of Federal Register, June 10, 1998.

64 FR 58909, U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States; Final Rule," *Federal Register*, Office of Federal Register, November 1, 1999.

64 FR 58910, U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States," *Federal Register*, Office of Federal Register, December 1, 1999.

65 FR 7764, National Marine Fisheries Service, "Designated Critical Habitat: Critical Habitat for 19 Evolutionarily Significant Units of Salmon and Steelhead in Washington, Oregon, Idaho, and California," *Federal Register*, Office of Federal Register, February 16, 2000.

66 FR 3244, Special Areas; Roadless Area Conservation. Department of Agriculture, U.S. Forest Service, January 12, 2001.

66 FR 231: 59734-59749. November 30, 2001. Endangered and threatened wildlife and plant; emergency rule to list the Columbia Basin distinct population segment of the pygmy rabbit (*Brachylagus idahoensis)* as endangered..

66 FR 64799-64800, Notice of Intent to prepare a Draft Environmental Impact Statement for a proposed noxious weed management program on the S-CNF, excluding areas of the FCRONRW.

7 USCA sec 2418, "Management of undesirable plants on Federal lands." 1974.

Amphibiaweb. 2003. http://elib.cs.berkeley.edu/aw.

Animaldiversityweb. 2003. http://animaldiversity.ummz.umich.edu.html.

Arnold, S. F., D. M. Klotz, B. M. Collins, P. M. Vonier, L. J. Guillette Jr., and J. A. McLachlan. 1996. Synergistic activation of estrogen receptor with combinations of environmental chemicals. Science 272: 1489-1492.

Asher, J. and D. Harmon. 1996. Invasive exotic plants are destroying the naturalness of U.S. Wilderness Areas. Intl. Journal of Wilderness 1(2): 35-37.

Asher, J. and C. Spurrier. 1998. The spread of invasive weeds in western wildlands: A state of biological emergency. Presentation at the Governor's Idaho weed summit. Boise, Idaho, May 19, 1998.

Aubry, K. B., G. M. Koehler, and J. R. Squires. 1999. Ecology of Canada lynx in southern boreal forests. In Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, et al., tech. eds. The scientific basis for lynx conservation in the contiguous United States: USDA-Forest Service. RMRS-GTR-30. 167 p

Autenreith, R., W. Molini, and C. Braun., eds. 1982. Sage grouse management practices. Tech. Bull. 1. Twin Falls, ID: Western States Sage Grouse Committee. 42 p.

Bakke, D. 2001. A Review and Assessment of the Results of Water Monitoring for Herbicide Residues for the Years 1991 to 1999, USFS Region 5. Prepared by D. Bakke, Regional Pesticide-Use Specialist. February 2001.

Banci, V. 1994. Wolverine. *In*: L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, W. J. Zielinski, tech eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the Western United States. Forest Service GTR-RM-254. 184 p.

Barclay, R. M. R. 1991. Population structure of temperate zone insectivorous bats in relation to foraging behavior and energy demand. Journal of Animal Ecology. 60: 165-178.

Barnett, J. K. 1993. Diet and nutrition of female sage grouse during the pre-laying period. M.S. Thesis, Oregon State University, Corvallis. 46 pp.

Barnett, J. K. and J. A. Crawford. 1994. Pre-laying nutrition of sage grouse hens in Oregon. Journal of Range Management 47:114-118.

Beale, D. M. and A. D. Smith. 1970. Forage use, water consumption, and productivity of pronghorn antelope in western Utah. Journal of Wildlife Management. 34(3): 570-582.

Beck, T. D. I. 1975. Attributes of a wintering population of sage grouse, North Park, Colorado. Thesis, Colorado State University, Fort Collins, Colorado, USA.

Beck, T. D. I. 1977. Sage grouse flock characteristics and habitat selection during winter. Journal of Wildlife Management 41:18-26.

Behnke, R. J. 1992. Native trout of Western North America. *American Fisheries Society Monograph 6.* Bethesda, Maryland.

Bellrose, F. C. 1980. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pennsylvania, USA. 540 pp.

Best, K. F., G. G. Bowes, A. G. Thomas, and M. G. Maw. 1980. The biology of Canadian weeds. 39. *Euphorbia esula* L. Canadian Journal of Plant Science 60: 651-663.

Bio-Weed®. 2002. Material Safety Data Sheet (MSDS) for Bio-Weed®. http://www.bioscape.com/msds.pdf. June 2, 2002.

Bjorge, R. R. and J. R. Gunson. 1989. Wolf, Canis lupus, population characteristics and prey relationships near Simonette River, Alberta. Canadian Field Naturalist 103:327-334.

Bjornn, T. C. and D. W. Reiser. 1991. "Habitat requirements of salmonids in streams." In Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. William R. Meehan, ed., U.S. Department of Agriculture, Forest Service. American Fisheries Society Special Publication 19. Bethesda, Maryland.

Bock, C. E. and J. H. Bock. 1987. Avian habitat occupancy following fire in a Montana shrubsteppe. Prairie Naturalist. 19(3): 153-158.

Bock, C. E. and J. F. Lynch. 1970. Breeding bird populations of burned and unburned conifer forests in the Sierra Nevada. Condor 72:182-189

Bull, E. L. and M. G. Henjum. 1990. Ecology of the great gray owl. USDA-Forest Service. PNW-GTR-265. 39 p.

Burnside, O. C., C. R. Fenster, L. L. Evetts, and R. F. Mumm. 1981. Germination of exhumed weed seeds in Nebraska. Weed Science 29:577-586.

Burt, W. H. and R. P. Grossenheider. 1980. Peterson field guides: mammals. Houghton-Mifflin, New York, NY. 289 p.

Buskirk, S. W. and R. A. Powell. 1994. Habitat ecology of American martens and fishers. In: S. W. Buskirk, A. Harestad, M. Raphael, and R. A. Powell, eds. Martens, sables and fishers: biology and conservation. Ithaca, NY: Cornell University Press: 283-296.

Butte Soil and Water Conservation District. 2001. Lost River Cooperative Weed Management Area 2001 Annual Report and 2002 Operating Plan. Arco, Idaho http://www.agri.state.id.us/animal/weedoverview.htm. May 13, 2002.

Call, M. W. 1979. Habitat requirements and management recommendations for sage grouse. USDI Bureau of Land Management, Denver, CO. 37 p.

Callihan, R. H., R. R. Old, and R. S. Burnworth. 1991. Sulfur cinquefoil. Pacific Northwest Extension Bulletin 376.

Callihan, R. H. and T. W. Miller (revised by Don W. Morishita and Larry W. Lass). 1999. Idaho's Noxious Weeds. 74 p. Ag Publishing, University of Idaho, Moscow, Idaho

Campell D. L., J. Evans, G. D. Lindsey, and W. E. Dusenberry. 1981. Acceptance by black-tail deer of foliage treated with herbicides. Research Paper PNW-290. USDA Forest Service. Pacific Northwest Forest Range Experiment Station. Portland, Oregon.

Carey, C. and C. Bryant. 1995. Possible interrelations among environmental toxicants, amphibian development, and decline of amphibian populations. Environmental Health Perspectives. Volume 103, Supplement 4. May.

Cassirer, E. F. and C. R. Groves. 1994. Ecology of harlequin ducks in northern Idaho. Unpublished Report, Idaho Department of Fish and Game, Boise, Idaho, USA.

Cassirer, E. F., G. Schirato, F. Sharpe, C. R. Groves, and R. N. Anderson. 1993. Cavity nesting by harlequin ducks in the Pacific Northwest. Wilson Bulletin 105:691-694.

Chamberlin, T. W., R. D. Harr, and F. H. Everest. 1991. "Timber harvesting, silviculture, and watershed processes." In Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. William R. Meehan, ed., U.S. Department of Agriculture, Forest Service. American Fisheries Society Special Publication 19. Bethesda, Maryland.

Chicoine, T. K. 1984. Spotted knapweed (*Centaurea maculosa* L.): Control, seed longevity and migration in Montana. M.S. Thesis Montana State University. Bozeman, MT. 96 p.

Clemente, F., R. Valdez, and J. L Holechek (and others). 1995. Pronghorn home range relative to permanent water in southern New Mexico. Southwestern Naturalist. 40(1): 38-41.

Coffin, K. W., Q. J. Kujala, R. J. Douglass, and L. R. Irby. 1997. Interactions among marten prey availability, vulnerability, and habitat structure. In: G. Prouls, H. N. Gryant, and P. M. Woodard, eds. *Martes*: taxonomy, ecology, techniques, and management: Proceedings of the 2d international *Martes* symposium; (Dates of meeting unknown); (Meeting location unknown). Edmonton, AB: The Provincial Museum of Alberta: 199-211.

Connelly, J. W., H. W. Browers, and R. J. Gates. 1988. Seasonal movements of sage grouse in southeastern Idaho. Journal of Wildlife Management 52:116-122.

Connelly, J. W., W. L. Wakkinen, A. D. Apa, and K. P. Reese. 1991. Sage grouse use of nest sites in southeastern Idaho. J. Wildl. Manage. 55(3):521-524.

Cooper, J. G. 1868. The fauna of Montana territory. American Naturalist. 2: 528-538.

Cornell Lab of Ornithology web site. 2003. http://birds.cornell.edu/BOW/YELWAR/

Coulter, M. W. 1966. Ecology and management of fishers in Maine. Syracuse Univ, Syracuse, NY. Ph.D. Thesis.

Council on Environmental Quality. 1978. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. 40 CFR (Code of Federal Regulations) Parts 1500-1508.

Council on Environmental Quality. 1983. Guidance Regarding NEPA Regulations: 40 Questions and Answers About the NEPA Regulations.

Cousens, R. and M. Mortimer. 1995. Dynamics of Weed Populations. Cambridge University Press. Cambridge, Great Britain. Chapter 2, pp. 21-54.

Crabtree, C. and L. Lake. 2001. Interagency Information Management for Weed Control. Presented by Carl Crabtree (Idaho County) and Leonard Lake (U.S. Forest Service) at Invasive Species Mapping and Technologies Workshop, Boise, Idaho, October 24, 2001.

Crouch, E. A. C. and R. Wilson. 1982. Risk benefits analysis, Cambridge, Mass. Ballinger.

Dalke, P. D., D. B. Pyrah, D. C. Stanton, J. E. Crawford, and E. F. Schlatterer. 1963. Ecology, productivity, and management of sage grouse in Idaho Journal of Wildlife Management 27:810-841.

Davis, E. S. 1990. Spotted knapweed (*Centaurea maculosa Lam.)* seed longevity, chemical control and seed morphology. M.S. Thesis. Montana State Univ., Bozeman, MT.

Deblinger, R. D. and A. W. Alldredge. 1991. Influence of free water on pronghorn distribution in a sagebrush/steppe grassland. Wildlife Society Bulletin. 19(3): 321-326.

DeGraaf, R. M. and D. D. Rudis. 1986. New England wildlife: habitat, natural history, and distribution. Gen. Tech. Rep. NE-108. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 491 p.

DeGraaf, R. M., V. E. Scott, R. H. Hamre, L. Ernst, and S. H. Anderson. 1991. Forest and rangeland birds of the United States natural history and habitat use. U.S. Department of Agriculture, Forest Service, Agriculture Handbook 688. 625pp.

Dobler, F. C., J. Eby, S. Richardson, M. Vander Haegen. 1996. Status of Washington's shrub-steppe ecosystem: extent, ownership, and wildlife/vegetation relationships. Res. Rep. Olympia, WA: Washington Department of Fish and Wildlife.

Doering, R. W. and B. L. Keller. 1998. A survey of bat species of the Bruneau-Jarbridge River Area of southwestern Idaho with special reference to the occurrence of the spotted bat (*Euderma maculatum)*. Technical Bulletin No. 98-18. Idaho Bureau of Land Management. 29pp.

Donald, W. W. 1994. The biology of Canada thistle (*Cirsium arvense*). Rev. Weed Science 6:77-101.

Donigian, A. S. and P. S. Rao. 1987. Overview of terrestrial processes and modeling. *In*: Vadose zone modeling of organic pollutants. S. C. Hern and S. M. Melancon (eds). Boca Raton, FL. Lewis Publishers.

DOW. 2000. MSDS for Rodeo. DOW AgroSciences LLC. http://www.cdms.net/ldat/mp4TN001.pdf.

DOW. 2001. Answers to questions about products containing picloram: picloram and animals/wildlife. Dow AgroSciences. Indianapolis, Indiana.

DOW. 2003. MSDS for Transline. DOW AgroSciences LLC. http://www.cdms.net/ldat/mp0BB002.pdf

Drut, M. S., J. A. Crawford, and M. A. Gregg. 1994a. Brood habitat use by sage grouse in Oregon. Great Basin Naturalist 54:170-176.

Drut, M. S., W. H. Pyle, and J. A. Crawford. 1994b. Technical note: diets and food selection by sage grouse chicks in Oregon. Journal of Range Management 47:90-93.

Duncan, J. R. and P. H. Hayward. 1994. Review of technical knowledge: great gray owls. *In*: Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. USDA-Forest Service, GTR-RM-253. 213 p.

Earle, R. D. 1978. The fisher-porcupine relationship in Upper Michigan. Michigan Tech. Univ. Houghton, MI. M.S. Thesis.

Edson, E. F. and D.M. Sanderson. 1965. Toxicity of the herbicides 2-methoxy-3,6-dichlorobenzoic acid (dicamba) and 2-methoxy-3,5,6-trichlorbenzoic acid (tricamba). Food Cosmet. Toxicol. 3-299-304.

Ellis, D. H. 1982. The peregrine falcon in Arizona: Habitat utilization and management recommendations. Institute for Raptor Studies, Research Report No. 1.

Eng, R. L. and P. Schladweiler. 1972. Sage grouse winter movements and habitat use in central Montana. Journal of Wildlife Management. 36: 141-146.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook. New York: Simon and Schuster. 785 p.

EXTOXNET. 2002. Extension Toxicology Network Data Sheets. http://ace.ace.orst.edu/info/extoxnet. June 2, 2002.

Finch, D. M. 1992. Threatened, Endangered, and Vulnerable Species of Terrestrial Vertebrates in the Rocky Mountain Region. USDA Forest Service General Technical Report RM-215.

Fire Effects Information System. 2002. http://www.fs.fed.us/database/feis/animals/birds/mountainbluebird

Fisher, F. B., J. C. Winne, M. M. Thornton, T. P. Tady, Z. ma, M. M. Hart, and R. L. Redmond. 1998. Montana land cover atlas. Unpublished report. Montana Cooperative Wildlife Research Unit. University of Montana, Missoula. viii +50 pp.

Gabler, K. I. 1997. Distribution and habitat requirements of the pygmy rabbit on the Idaho National Environmental and Engineering Laboratory, M.S. Thesis. Department of Biology, Idaho State University, Pocatello, ID.

Gaines, D. 1974. Review of the status of the Yellow-billed Cuckoo in California: Sacramento Valley populations. Condor 76:204-209.

Gaines, D. 1977. Current status and habitat requirements of the Yellow-billed Cuckoo in California: 1977 Endangered Wildlife Program, Nongame Wildlife Investigations, California Department of Fish and Game.

Gaines, D. and S. A. Laymon. 1984. Decline, status and preservation of the Yellow-billed Cuckoo in California. Western Birds 15:49-80.

Genter, D. L. and K. A. Jurist. 1995. Bats of Montana. Montana Natural Heritage Program. 11 p.

Guillette, L. J. Jr., D. A. Crain, M. P. Gunderson, S. E. A. Kools, M. R. Milnes, E. F. Orlando, R. A. Rooney, and A. R. Woodward. 2000. "Alligators and Endocrine Disrupting Contaminants: A Current Perspective" Amer. Zool., 40:438–452 (2000).

Gregg, M. A. 1991. Use and selection of nesting habitat by sage grouse in Oregon. Corvallis, OR: Oregon State University. M.S. Thesis.

Gregg, M. A. 1992. Use and selection of nesting habitat by sage grouse in Oregon. M.S. Thesis, Oregon State University, Corvallis. 46 pp.

Gregg, M. A., J. A. Crawford, and M. S. Drut. 1993. Summer habitat use and selection by female sage grouse (*Centrocercus urophasianus*) in Oregon. Great Basin Naturalist 53:293-298.

Gregg, M. A., J. A. Crawford, M. S. Drut, and A. K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. Journal of Wildlife Management 58:162-166.

Groves, C. R. 1988. Distribution of the wolverine in Idaho as determined by mail questionnaire. Northwest Science. 62:181-185.

Groves, C. R., B. Butterfield, A. Lippincott, B. Csuti, and J. M. Scott. 1997. Atlas of Idaho's Wildlife. Integrating Gap Analysis and Natural Heritage Information.

Hall, E. R. 1928. Notes on the life history of the sagebrush meadow mouse (*Lagurus*). Journal of Mammalogy. 9: 201-204.

Hall, R. and P. Henry. 1992. Assessing effects of pesticides on amphibians and reptiles. Status and Need. Herpetological Journal Vol. 2.

Hann, W. J., J. L. Jones, and M. G. Karl [and others]. 1997. Landscape dynamics of the basin. In: Quigley, T. M.; Arbelbide, S. J., tech. eds. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 337-1055. Vol. 2. Chapter 3. (Quigley, Thomas M.; Arbelbide, S. J., tech. ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Harris, L. D. 1984. The fragmented forest: island biogeography theory and the preservation of biotic diversity. University of Chicago Press. Chicago, IL.

Hayward, G. D. and J. Verner, tech. eds. 1994. Flammulated, boreal and great gray owls in the United States: A technical conservation assessment. USDA-Forest Service GTR-RM-253. 214 p.

Hayward, G. D., P. H. Hayward, and E. O. Garton. 1993. Ecology of boreal owls in the northern Rocky Mountains, U.S.A. Wildlife Monographs. The Wildlife Society. 59 p.

Heady, L. T. 1998. Home Range, habitat, and activity patterns of pygmy rabbits (*Brachylagus idahoensis*) in southeast Idaho. M.S. Thesis. Idaho State University. Pocatello, ID. 72 pps.

Heady, L. T., K. I. Gabler, and J. W. Laundre. 2001. Habitat selection by pygmy rabbits in southeast Idaho. BLM Technical Bulletin. No. 01-7.

Henderson, R. 1987. Status and control of purple loosestrife in Wisconsin. Research management findings, Number 4, Bureau of Research, Wisconsin DNR, Madison.

Herbert, R. A. and K. G. S. Herbert. 1969. The extirpation of the Hudson River peregrine falcon population. Pages 133-154 *In*: J. J. Hickery, ed. Peregrine falcon populations: their biology and decline. University Wisconsin Press, Madison, Wisconsin, U.S.

Hickenbottom, J. A. S. 2000. A comparative analysis of surface erosion and water runoff from existing and recontoured Forest Service roads: O'Brien Watershed, Lolo National Forest, Montana. M.S. Thesis, University of Montana, Missoula. 178 pp.

Hirsch, S. A. and J. A. Leitch. 1996. "The Impact of Knapweed on Montana's Economy." Agricultural Economics Report No. 355. Department of Agriculture Economics. Agricultural Experiment Station, North Dakota State University. Fargo, N.D.

Hitchcock, C. L. 1964. *Physaria*. pp. 529-532. *In*: C. L. Hitchcock, A. Cronquist, M. Ownbey, and J. W. Thompson. Vascular plants of the Pacific Northwest, Part II. University of Washington Press, Seattle.

Hodgson, J. M. 1968. The nature, ecology and control of Canada thistle. U.S. Dept. of Ag. Tech. Bull. #1386.

Hutto, R. L. 1995. The composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9(5): 1041-1058.

I.C. § 22-2401 *et. seq.* - Noxious Weeds.

Idaho Department of Agriculture. 1999. Idaho Strategic Plan for Managing Noxious Weeds. February 1999.

Idaho Department of Agriculture. 2002a. Quick reference table. http://www.agri.state.id.us/PDF/Animal/NW%20Quick%20Ref.pdf. May 10, 2002.

Idaho Department of Agriculture. 2002b. "Noxious News," April 2002.

Idaho Department of Commerce 2000. Tourism and travel study. Prepared by University of Idaho.

Idaho Department of Fish and Game. 1991. Fisheries Management Plan 1991-1995. Boise, ID: Idaho Department of Fish and Game.

Idaho Department of Fish and Game. 1999. Economic impact of deer and elk hunting in Idaho. http://www2.state.id.us/fishgame/Hunt/ProgramsInfo/presentations/economics/tsld002.htm. Accessed August 2003.

Idaho Department of Fish and Game. 2001. Fisheries Management Plan 2001–2006. Boise, ID: Idaho Department of Fish and Game [not paginated].

Idaho Department of Fish and Game. 2002a. IDAPA 13.01.06.150, "Classification and Protection of Wildlife."

Idaho Department of Fish and Game. 2002b. Salmonomics: Salmon and Steelhead Could be Steady and Substantial Contributors to Idaho's Economy." Idaho Wildlife Online Magazine. Idaho Department of Fish and Game, Boise, Idaho. August 2002. http://www2.state.id.us/fishgame/incredid/Aug2002/salmonics.htm. Accessed August 2003.

Information Ventures, Inc. 2002. Environmental Health Clearinghouse. 2002. Pesticide Fact Sheets. http://infoventures.com/e-hlth/pestcide/pest-fac.html. June 2, 2002.

Ingles, L. G. 1965. Mammals of the Pacific states. Stanford Univ. Press, Stanford, CA. 506 p.

Interior Columbia Basin Ecosystem Management Plan. 2000. Proposed Decision. December 2000.

Jankovsky-Jones, M. 1999. Conservation strategy for wetlands in east-central Idaho. IDFG-Conservation Data Center.

Johnsgard, P. A. 1990. Hawks, eagles, and falcons of North America. Smithsonian Institution Press, Washington, D.C.

Johnson, F. D. 1995. Wild trees of Idaho. College of Forestry, Wildlife and Range Sciences. University of Idaho Press. Moscow, Idaho. 212 p.

Jones, H. G. 1983. Plants and microclimate: a quantitative approach to environmental plant physiology. Cambridge University Press, Cambridge, England. 456 p.

Jones, J. L. 1991. Habitat use of fishers in north central Idaho. Univ. of Idaho, Moscow, ID. M.S. Thesis. 147 p.

Jones, J. L. and E. O. Garton. 1994. Selection of successional stages by fishers in northcentral Idaho. *In*: Buskirk, S.W., Harestad, A, Raphael, M. eds. Martens, sables, and fishers: biology and conservation. Cornell Univ. Press, Ithaca, NY. 377-387.

Journal of Range Management. 35: 724-726.

Kaiser, J. 1996. New yeast study finds strength in numbers. Science 272: 1418.

Katzner, T. E. 1994. Winter ecology of the pygmy rabbit in Wyoming. M.S. University of Wyoming. Laramie, WY. 124 pps.

Kelly, G. M. 1977. Fisher (*Martes pennanti*) biology in the White Mountain National Forest and adjacent areas. Univ. of Massachusetts, Amherst, MA. Doctorate. 178 p.

Kelsey, R. G. and L. J. Locken. 1989. *In*: P. K. Fay and J. R. Lacey (eds.), Proceedings of knapweed symposium. Montana State University, Bozeman, MT. 172-174.

Kingery, H. E. 1981. 1980: The year of the Cuckoo. Colorado Field Ornithologist Journal 15(3):86-87.

Klebenow, D. A. 1969. Sage grouse nesting and brood habitat in Idaho. Journal of Wildlife Management 33:649-661.

Klinkhamer, P. G. L and T. J. DeJong. 1993. Cirsium vulgare (Savi) Ten.: (*Carduus lanceolatus* L., *Cirsium lanceolatum* (L.) Scop., non Hill). Journal of Ecology. 81: 177-191.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology. 68:85-851.

Koehler, G. M. and J. D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry 88:10-14.

Lacey, J. R., C. B. Marlow, and J. R. Lane. 1989. Influence of spotted knapweed (*Centaurea maculosa*) on surface water runoff and sediment yield. Weed Technology 3:627-631.

Lee, D. C., J. R. Sedell, B. E. Rieman [and others]. 1997. Broad-scale assessment of aquatic species and habitats. In: Quigley, T. M.; Arbelbide, S. J., tech. eds. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 337-1055. Vol. 2. Chapter 3. (Quigley, T. M.; Arbelbide, S. J., tech. ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Lemhi Cooperative Weed Management Area. 2001. Cooperative Agreement. Salmon, Idaho.

Lemhi Cooperative Weed Management Area. 2001. Annual Report. Salmon, Idaho http://www.agri.state.id.us/animal/weedoverview.htm. May 13, 2002.

Leonard, W. P., H. A. Brown, L. C. Jones, K. R. McAllister, and R. M. Storm. (1993) *Amphibians of Washington and Oregon*. Seattle Audubon Society. Seattle, Washington.

Lewis, L. and C. R. Wegner. 1998. Idaho's Canada lynx: pieces of the puzzle. Tech. Bull. 98-11. Boise, ID: U.S. Department of the Interior, Bureau of Land Management, Idaho State Office. 19 p.

Linder, B. D. 1994. Habitat utilization and behavior of nesting Lewis woodpeckers (*Melanerpes lewis*) in the Laramie Range, southeast Wyoming. Laramie, WY: University of Wyoming. 98 p. M.S. Thesis.

Linkhart, B. D., R. T. Reynolds, and R. A. Ryder. 1995. Home range and habitat of breeding flammulated owls in Colorado. Wilson Bulletin 110(3):342-351.

Lorain, C. C. 1993. Conservation strategy for *Mimulus clivicola*. Prepared for USDA Forest Service, Northern Region, Missoula, MT. 22 pp. plus appendices.

Lyman, R. L. 1991. Late quaternary biogeography of the pygmy rabbit (*Brachylagus idahoensis*) in eastern Washington. Journal of Mammalogy. 72(1):110-117.

Madsen, S. B. 1962. Germination of buried and dry stored seeds III: 1934-1960. Proceeding Int. Seed Test. Assoc. 27:920-928.

Mayer, F. L. and M. R. Ellersieck. 1986. Manual of acute toxicity: interpretation and data base for 410 chemicals and 66 species of freshwater animals. USDI Fish and Wildlife Service, Resource Publication 160.

McCarty, M. K. 1982. Musk thistle (*Carduus thoermeri*) seed production. Weed Science 30:441-445.

McCord, C. M. and J. E. Cardoza. 1982. Bobcat and lynx. *In*: J.A. Chapman and G.A. Feldhamer, eds. Wild mammals of North America biology, management, and economics. Johns Hopkins University Press, Baltimore, MD.

McEllin, S. M. 1979. Nest sites and population demographics of white-breasted and pygmy nuthatches in Colorado. Condor. 81(4): 348-352.

McGarigal, K. 1988. Human-eagle interactions on the lower Columbia River. M.S. Thesis, Oregon State University, Corvallis, OR. 108 pp.

Mech, L. D. 1989. Wolf population survival in an area of high road density. American Midlands Naturalist 121:387-389.Pierson, E. D., M. C. Wackenhut, J. S. Autenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho. 42pp.+ appendices. Available from P.O. Box 25, Boise, ID 83707-0025.

Medd, R. W. and J. V. Lovett. 1978. Biological studies of *Carduus nutans* (L.) spp. nutans. I. Bermination and light requirements of seedlings. Weed Res. 18:363-367.

Merriam, C. H. 1891. Results of a biological reconnaissance of south-central Idaho. Division of Ornithology and Mammology, North American Fauna No. 5, Published by the Secretary of Agriculture, Washington Government Printing Office.

MicroFlo. 1999. MSDS for Banvel. http://www.cdms.net/ldat/mp2CB002.pdf.

MicroFlo. 2003. Specimen Label for Banvel. http://www.cdms.net/ldat/ld2CB007.pdf. Accessed July 2003.

Monnig, E. 1988. Human health risk assessment for herbicide application to control noxious weeds and poisonous plants in the Northern Region. FPM Report 88-9. USDA Forest Service. Missoula, Montana.

Monteith, J. L. and M. H. Unsworth. 1990. Principles of environmental biophysics. 2nd Edition. Edward Arnold, London, England.

Montgomery, A. 2001. Congressional passage of NREPA is still the best hope for the big wild *in* Wild Rockies Networker, Quarterly Journal of Alliance for the Wild Rockies, winter 2001-02, Volume 13, Issue No. 4.

Moore, R. J. 1975. The biology of Canadian weeds. 13. Cirsium arvense (L.) Scop. Canadian J. Plant Sci. 55:1033-1048.

Morishita, D. W. and L. W. Lass. (no date). Idaho's noxious weeds. Univ. of Idaho (Noxious Weed Advisory Council and ID Dept. of AG), Moscow, ID. 74 p.

Moseley, R. K. 1992a. Rare plant inventory of Idaho forest Highway 30 Project (US 93) Twin Creek to Lost Trail Pass. IDFG-Conservation Data Center. 7 p.

Moseley, R. K. 1992b. The floristic features of Rock Creek cirque, Challis National Forest. IDFG-Conservation Data Center. 14 p. plus appendices.

Moseley, R. K. and M. Mancuso. 1990. Long-term demographic monitoring of two Stanley Basin endemics. *Draba trichocarpa* and *Eriogonum meledonum*. I. Monitoring establishment and first-year results. IDFG-Natural Heritage Section. 12p. plus appendices.

Moseley, R. K., M. Mancuso, and J. Hilty. 1990a. Field investigation and status survey of *Penstemon lemhiensis* (Lemhi penstemon) in Idaho. IDFG-Natural Heritage Section. 17p. plus appendices

Moseley, R. K., M. Mancuso, and S. L. Caicco. 1990b. Field investigations of two sensitive plant species on the Salmon National Forest: *Phacelia lyallii* and *Physaria didymocarpa* var. *lyrata*. IDFG-Natural Heritage Section. 17p plus appendices.

Moseley, R. K. and M. Mancuso. 1993. Demographic monitoring of two Stanley Basin endemics. *Draba trichocarpa* and *Eriogonum meledonum*. III. Third-year results. IDFG-Conservation Data Center. 25p. plus appendices.

Mouat, D., J. Lancaster, T. Minor, K. Mussallem, T. Wade, J. Wickham. 1993. Report: Ecological Risk Assessment. Case Study. Environmental Protection Agency. pp. 17.

Mullican, T. R. and B. L. Keller. 1986. Ecology of the sagebrush vole (*Lemmiscus curtatus*) in southeastern Idaho. Canadian Journal of Zoology. 64(6): 1218-1223.

Mullison, W. R. 1985. A toxicological and environmental review of picloram in the 38th annual meeting of the Western Society of Weed Science. Phoenix, Arizona.

Murphy, M. L. and W. R. Meehan. 1991. "Stream ecosystems." In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*. William R. Meehan, ed., U.S. Department of Agriculture, Forest Service. American Fisheries Society Special Publication 19. Bethesda, Maryland.

National Marine Fisheries Service. 2002a. *Endangered Species Act Section 7 Consultation Biological Opinion and Magnuson-Steven Fishery Conservation and Management Act Essential Fish Habitat Consultation: Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest, Upper Salmon River Basin.* Seattle, Washington.

National Marine Fisheries Service. 2002b. Endangered Species Act Status Reviews and Listing Information. http://www.nwr.noaa.gov/1salmon/salmesa/index.htm. June 5, 2002.

National Marine Fisheries Service. 2003. U.S. District Court Approves a NMFS Consent Decree Withdrawing Critical Habitat Designations for 19 Evolutionarily Significant Units of Salmon and Steelhead.
http://www.nwr.noaa.gov/1salmon/salmesa/index.html
http://www.nwr.noaa.gov/1press/Chdecree.html. March 17, 2003.

Neihoff, J. 1997. Message to Idaho Panhandle National Forest employees regarding the possible carcinogenicity of spotted knapweed sap.

Nelson, R. L., M. L. McHenry, and W. S. Platts. 1991. "Mining." In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*. William R. Meehan, ed., U.S. Department of Agriculture, Forest Service. American Fisheries Society Special Publication 19. Bethesda, Maryland.

Norris, L. A., H. W. Lorz, and S. V. Gregory. 1991. Forest chemicals. American Fisheries Society Special Publication 19:139-179.

Noss, R., G. Wuerthner, K. Vance-Borland, C. Carroll. 2001. A biological conservation assessment for the Utah-Wyoming Rocky Mountains Ecoregion: A report to the Nature Conservancy.

Nussbaum, R. A., E. D. Brodie, Jr., and R. M. Storm. 1983. *Amphibians and reptiles of the Pacific Northwest*. University of Idaho Press. Moscow, ID.

Oakleaf, R. J. 1971. The relationship of sage grouse to upland meadows in Nevada. Federal Aid Project W-28-2. [Place of publication unknown]: [Publisher unknown]: 155-171.

Olson, B. E. Impacts of noxious weeds on ecologic and economic systems. *In*: Sheley, R.L. and J. K. Petroff. eds. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, OR. Pp. 4-18.

Padgett, W. G., A. P. Youngblood, and A. H. Winward. 1989. Riparian community type classification of Utah and southeastern Idaho. R4-Ecol-89-01. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Region. 191p.

Partners in Flight. 2002. Idaho Bird Conservation Plan. Bird Conservation Region #10 (Northern Rockies) Idaho PIF Priority Species List, May 20, 2002.

Pesticide Management Education Program (PEMP). 2002. http://pmep.cce.cornell.edu/. Program of Cornell University. June 2, 2002.

Peterson, J. G. 1970. The food habits and summer distribution of juvenile sage grouse in central Montana. Journal of Wildlife Management. 34(1): 147-155.

Pierson, E. D., M. C. Wackenhut, J. S. Autenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho. 42pp.+ appendices. Available from P.O. Box 25, Boise, ID 83707-0025.

PNW Weed Control Handbook. 2002. http://weeds.ippc.orst.edu/pnw/weeds. May 15, 2002.

Powell, R. A. and W. J. Zielinski. 1994. Fisher. *In*: L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, W. J. Zielinski, tech eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the Western United States. Forest Service GTR-RM-254. 184 p.

Quigley, T. M. and S. J. Arbelbide. 1997. *An Assessment of Ecosystem Components in the Interior Columbia Basin*, U.S. Department of Agriculture. 1997.

Quinn, N. W. S. and G. Parker. 1987. Lynx. In M. Novak, J. A. Barber, M. E. Obbard, and B. Malloch, eds. Wild furbearer management and conservation in North America. Ontario Ministry of Natural Resources.

Ramsey, F. L., M. McCracken, J. A. Crawford, M. S. Drut, and W. J. Ripple. 1994. Habitat association studies of the northern spotted owl, sage grouse, and flammulated owl. Pages 189-209 in N. Lange, L. Billard, L. Conquest, L. Ryan, D. Brillinger, and J. Greenhouse, editors. Case studies in biometry. John Wiley & Sons, New York, NY.

Randall, J. M. 1991. Population dynamics and control of bull thistle, *Cirsium vulgare*, in Yosemite Valley. *In*: Center, T. D., R. F. Doren, R. L. Hofstetter, R. L. Myers, L. D. Whiteaker, eds. Proceedings of the Symposium on Exotic Pest Plants; 1988 November 2 - November 4; Miami, FL. Tech. Rep. NPS/NREVER/NRTR-91/06. Washington, D.C.: U.S. Department of the Interior, National Park Service: 261-281.

Randall, J. M. 1990. Establishment and control of bull thistle (*Cirsium vulgare*) in Yosemite Valley. *In*: Van Riper, C., III, T. J. Stohlgren, D. Veirs, Jr., S. C. Hillyer, eds. Examples of resource inventory & monitoring in national parks of California: Proceedings, 3rd biennial conference on research in California's national parks; 1988 September 13-15; Davis, CA: Trans. and Proceedings Series No.8. Washington, D.C.: U.S. Department of the Interior, National Park Service: 177-193.

Raphael, M. G. and L. C. Jones. 1997. Characteristics of resting and denning sites of American martens in central Oregon and western Washington. In: G. Proulx, H. N. Bryant, P. M. Woodard, eds. *Martes*: taxonomy, ecology, techniques, and management. Edmonton, AB: The Provincial Museum of Alberta: 146-165.

Reese, K. P. and W. E. Melquist. 1985. Distribution and status of 27 avian species of special concern in Idaho. Idaho Natural Heritage Program, The Nature Conservancy.

Reichel, J. D., D. L. Genter, and E. Atkinson. 1992. Sensitive animal species in the Elkhorn and Big Belt Mountains of the Helena National Forest. Montana Natural Heritage Program. Helena, MT. 102 pp.

Reynolds, R. T. and B. D. Linkhart. 1992. Flammulated owls in ponderosa pine: evidence of preference for old growth. In: Old-growth forests in the Southwest and Rocky Mountain regions: Proceedings of a workshop. Gen. Tech. Rep. RM-213. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 166-169.

Rice, P. M. 1990. A risk assessment method to reduce picloram contamination of streams and groundwater from weed spraying projects. Division of Biological Science, University of Montana, Missoula, MT.

Rice, P. M., C. A. Lacey, J. R. Lacey, and R. Johnson. 1991. Sulfur cinquefoil biology, ecology and management in pasture and rangeland. Montana State University Extension Bulletin 109. Montana State University, Bozeman, MT.

Rice, P. M., D. J. Bedunah, and C. E. Carlson. 1992. Plant community diversity after herbicide control of spotted knapweed (*Centaurea maculosa*). United States Department of Agriculture. U.S. Department of Agriculture, Forest Service Research Paper INT-460. 6 p.

Rice, P. M. 2001. INVADERS Database System (http://invader.dbs.umt.edu/). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.

Reynolds, R. T. and B. D. Linkhart. 1992. Flammulated owls in ponderosa pine: evidence of preference for old growth. In: Old-growth forests in the Southwest and Rocky Mountain regions. Proceedings of a workshop. Gen. Tech. Rep. RM-213. Fort Collins, CO. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 166-169.

Roberts, H. 1992. Birds of East Central Idaho. Northwest Printing, Inc., Boise, Idaho.

Robertson, J. A. 1986. Sage grouse-sagebrush relationships: a review. In: McArthur, E. D.; Welch, B. L., eds. Proceedings, symposium on the biology of *Artemisia* and *Chrysothamnus*; 1984 July 9-13; Provo, UT. Gen. Tech. Rep. INT-200. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 157-167.

Robertson, M. D. 1991. Winter ecology of migratory sage grouse and associated effects of prescribed fire in southeastern Idaho. Thesis, University of Idaho, Moscow, Idaho, USA.

Roche, C. 1988. Knapweed Newsletter 2(4):1.

Roche, C. T. and B. F. Roche. 1991. Meadow knapweed invasion in the Pacific Northwest, U.S.A. and British Columbia, Canada. Northwest Science 65:53-61.

Rogers, G. E. 1964. Sage grouse investigations in Colorado. Colorado Game, Fish and Parks Department, Tech. Publication 16. Game Research Division. Denver, CO. 132 p.

Rose, B., S-CNF, and M. Hughes, Sawtooth Hatchery, personal communication. June 1, 2002.

Rose, B. 2002. Salmon-Challis National Forest Watershed Project Monitoring Results: Herbicide Drift Studies in the Spring Creek Watershed, 2002.

Ruediger, B., J. Claar, S. Mighton, B. Naney, T. Rinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Bureau of Land Management, US Fish and Wildlife Service, USDI National Park Service. http://www.fs.fed.us/r2/lynx/1cas_Jan2000.htm (May 10, 2002) 110 pp.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 1999. The scientific basis for lynx conservation: qualified insights. In Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, tech. eds. The scientific basis for lynx conservation in the contiguous United States. USDA-Forest Service. RMRS-GTR-30. 167 p.

Runyan, et al. 1999. Idaho Travel Impacts, Idaho Department of Commerce, 1999.

Saab, V. A. and J. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. Research Paper RMRS-RP-11. Ogden, UT. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Safe, S. H., W. G. Foster, J. C. Lamb, R. R. Newbold, and G. Ven Der Kraak. 2000. "Estrogenicity and Endocrine Disruption," Issue Paper, No. 16. Council for Agricultural Science and Technology, July 2000. http://www.cast-science.org/cast-science.lh/pdf/endocrine.pdf

Saner, M. A., D. R. Clements, M. R. Hall, D. J. Doohan, and C. W. Crompton. 1995. The biology of Canadian weeds. 105. *Linaria vulgaris* Mill. Canadian Journal of Plant Science 75: 525-537.

Savage, D. E. 1969. The relationships of sage grouse to upland meadows in Nevada. Transactions, The Wildlife Society, California-Nevada Section. [Place of publication unknown]: the Wildlife Society. 16: 8-17.

Selleck, G. W., R. T. Coupland, and C. Frankton. 1962. Leafy spurge in Saskatchewan. *Ecological Monographs* 32: 1-29.

SERA. See Syracuse Environmental Research Associates, Inc.

Sheley, R. L. and J. K. Petroff, eds. 1999. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, OR. 438 p.

Simpson, J. C. and R. L. Wallace. 1978. Fishes of Idaho. The University Press of Idaho, Moscow, Idaho.

Society for Range Management. 1989. A Glossary of Terms Used in Range Management 3rd ed.

Soreng, R. J. 1991. Notes on new infraspecific taxa and hybrids in North American *Poa* (Poaceae). *Phytologia* 71(5):390-413.

Squires, J. R. and R. T. Reynolds. 1997. Northern goshawk (*Accipiter genitlis*). In: Poole, A.; Gill, F., eds. The birds of North America. No. 298. Philadelphia, PA: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union. 32 p.

Steele, R. 1977. *Physaria alpestris* var. *lyrata*. p. 30. *In*: Rare and Endangered Plant Technical Committee. Endangered and threatened plants of Idaho. Bulletin #21. Forest, Wildlife and Range Experiment Station, Univ. of Idaho, Moscow.

Steele, R. 1981. *Physaria didymocarpa* var. *lyrata*. p. 34. *In*: Rare and Endangered Plant Technical Committee. Vascular plant species of concern in Idaho. Bulletin #34. Forest, Wildlife and Range Experiment Station, Univ. of Idaho, Moscow.

Steele, R. 1983. *Physaria didymocarpa* var. *lyrata*. p. 7. *In*: Rare and Endangered Plant Technical Committee. 1983 status changes and additions to: Vascular plant species of concern in Idaho. Bulletin #34. Forest, Wildlife and Range Experiment Station, Univ. of Idaho, Moscow.

Steele, R., R. D. Pfister, A. R. Russell, and J. A. Kittams. 1981. Forest habitat types of central Idaho. USDA Forest Service, General Technical Report INT-114. Intermountain Forest and Range Experiment Station, Ogden, UT. 137p.

Steenhof, K. 1976. Ecology of wintering bald eagles in southeastern South Dakota. M.S. Thesis, University of Missouri, Columbia, MO. 146 pp.

Stephens, D. A. and S. H. Sturts. 1998. Idaho bird distributions. Special publication No. 11, Idaho Museum of Natural History, Pocatello, Idaho.

Stokes, D. W and L. Q. Stokes. 1996. Field guide to birds: western region. Little, Brown and Co. 519 p.

Syracuse Environmental Research Associates, Inc. 1996. Selected commercial formulations of glyphosate — Risk Assessment Final Report. Submitted to USDA Forest Service.

Syracuse Environmental Research Associates, Inc. 1999. Clopyralid — Final Report. Submitted to USDA Forest Service.

Syracuse Environmental Research Associates, Inc. 2001. 2,4-D — WordPerfect worksheets for human health and ecological risk assessments. Submitted to USDA Forest Service.

Syracuse Environmental Research Associates, Inc. 2003. *Glyphosate – Human Health and Ecological Risk Assessment Final Report.* http://www.fs.fed.us/r6/weeds/glyphosate032603/Glyphosate_FS_Risk_Assessment_March_2003_SERA_TR_02-43-09-04a.pdf. Accessed July 2003. Submitted to USDA Forest Service.

TechLine. 1998. Information About Invasive/Noxious Plant Mangement: Mormon Ridge Elk Winter Range Restoration Project, Lolo National Forest, Montana. Charles Henry: TechLine Editor.

The Nature Conservancy. 2001. Weed Control Methods Handbook. 1815 North Lynn Street, Arlington, VA.

The Nature Conservancy (various authors). 2002. Invasives on the web: element stewardship abstracts http://tncweeds.ucdavis.edu/index.html. May 10, 2002. 1815 North Lynn Street, Arlington, VA.

Tu, M., Hurd, C., and J. M. Randall. 2003. *Weed Control Methods Handbook: Tools & Techniques for Natural Areas*. The Nature Conservancy, http://tncweeds.ucdavis.edu/handbook.html, version. June 2003.

Turner, C. E. 1985. Conflicting interests and biological control of weeds. *In*: Delfosse, E.S. ed. Proceedings VI International Symposium on Biological Control of Weeds, August 19-25, 1984, Vancouver, Canada. Agriculture Canada. Pp. 203-225.

U.S. Bureau of Land Management. 1985. Environmental Impact Statement, Northwest Area Noxious Weed Control Program, app. C-1.

U.S. Census Bureau Census of Population and Housing. 2000. http://www.census.gov/prod/cen2000/. May 15, 2002.

U.S. Department of Energy. 2002. Fosamine Ammonium, Herbicide Fact Sheet. Bonneville Power Administration. http://www.efw.bpa.gov/portal/Organizations/Government/Federal/Dept_of_Energy/BPA/Environment/PPA/ROWMaintenance/fosamine.pdf. June 2, 2002.

U.S. Environmental Protection Agency. 1986. Quality criteria for water (the Gold Book): EPA 440/5-86-001. Office of Water Regulations and Standards. Washington, D.C.

U.S. Environmental Protection Agency. 1993. EPA RdD/Peer Report of Picloram.

U.S. Environmental Protection Agency. 1994. EPA Science Advisory Board Report: Assessment of Potential 2,4-D Carcinogenicity. EPA-SAB-EHC-94-005. Washington, D.C.

U.S. Environmental Protection Agency. 1997. Special Report on Environmental Endocrine Disruption: An Effects Assessment and Analysis. Risk Assessment Forum, Washington D.C. http://www.epa.gov/ORD/WebPubs/endocrine/endocrine.pdf. Accessed July 2003.

U.S. Environmental Protection Agency. 2002. Biopesticide Fact Sheet. Office of Pesticide Programs. http://www.epa.gov/pesticides/biopesticides/factsheets. June 2, 2002.

U.S. Environmental Protection Agency. 2003. Inert Ingredients in Pesticide Products as found on Internet at: http://www.epa.gov/opprd001/inerts. Accessed July 2003.

U.S. Forest Service. 1981. Elk Habitat Relationships for Central Idaho.

U.S. Forest Service. 1984a. Agriculture, Forest Service, Intermountain Region, Ecology and Classification Program. 104 p. [Preliminary draft].

U.S. Forest Service. 1984b. Pesticide background statements. Vol. 1 – Herbicides. Forest Service Agricultural Handbook No. 633. Washington, D.C.

U.S. Forest Service. 1986. Intermountain Region Noxious Weed and Poisonous Plant Control Program Final EIS.

U.S. Forest Service. 1987a. Final EIS and Land Resource Management Plan for the Challis National Forest.

U.S. Forest Service. 1987b. Finding of No Significant Impact, Decision Notice, and Environmental Assessment for the Noxious Weed Control Program, Salmon National Forest.

U.S. Forest Service. 1987c. Land Resource Management Plan for the Challis National Forest. Challis National Forest, Challis, Idaho, as amended.

U.S. Forest Service. 1988a. Final EIS and Land Resource Management Plan for the Salmon National Forest.

U.S. Forest Service. 1988b. Land Resource Management Plan for the Salmon National Forest. Salmon National Forest, Salmon, Idaho, as amended.

U.S. Forest Service. 1989. Finding of No Significant Impact, Decision Notice, and Environmental Assessment for Noxious Weed and Poisonous Plant Control, Challis National Forest.

U.S. Forest Service. 1990a. Idaho and Wyoming endangered and sensitive plant field guide. USDA Forest Service Intermountain Region, Ogden, Utah. 192 p.

U.S. Forest Service. 1990b. NY Botanical Gardens Collection. Collected 1957. Specimen ID: 5308.

U.S. Forest Service. 1991a. Forest and Rangeland Birds of the United States, Natural History and Habitat Use USDA- Forest Service Agricultural Handbook 688. 625 p.

U.S. Forest Service. 1991b. Threatened , Endangered, and Sensitive Species of the Intermountain Region.

U.S. Forest Service. 1992a. Challis Forest Plan for the Challis National Forest, Challis National Forest, Challis, Idaho, as amended.

U.S. Forest Service. 1992b. Risk assessment for herbicide use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration sites. Washington, D.C. FS 533187-9-30.

U.S. Forest Service. 1993. Draft supplemental environmental impact statement on management of habitat for late-successional and old-growth-related species within the range of the northern spotted owl. Appendix A: forest ecosystem management: an ecological, economic, and social assessment.

U.S. Forest Service. 1995a. Forest Service Manual on Noxious Weed Management.

U.S. Forest Service. 1995b. Lost Trail-Gibbonsville Integrated Resource Analysis.

U.S. Forest Service 1995c. Dicamba Pesticide Fact Sheet.

U.S. Forest Service. 1996. Salmon Land and Management Plan. Amended April 1996.

U.S. Forest Service. 1998a. North Fork Headwaters Watershed Analysis. North Fork Ranger District, Salmon-Challis National Forest.

U.S. Forest Service. 1998b. Strategy for Noxious and Nonnative Invasive Plant Management.

U.S. Forest Service. 1999a. Frank Church River of No Return Noxious Weed Treatments Final Environmental Impact Statement. Intermountain and Northern Regions: Bitterroot, Nez Perce, Payette, and Salmon-Challis National Forests.

U.S. Forest Service. 1999b. Monitoring and Evaluation Report for 1998 and 1999.

U.S. Forest Service 2000a. Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment. 2000.

U.S. Forest Service. 2000b. Salmon Land and Resource Plan. Amended July 2000.

U.S. Forest Service. 2001a. Beaverhead-Deerlodge National Forest Noxious Weed EIS.

U.S. Forest Service. 2001b. IMAZAPIC [Plateau and Plateau DG] —Human Health and Ecological Risk Assessment—Final Report. Syracuse Environmental Research Associates, Inc. Fayetteville, NY.

U.S. Forest Service. 2001c. Lolo National Forest Big Game Winter Range and Burned Weed Management Final Environmental Impact Statement.

U.S. Forest Service. 2001d. Sandpoint Ranger District Noxious Weeds Control Final Environmental Impact Statement. 2001.

U.S. Forest Service. 2001e. Salmon-Challis National Forest and Lemhi Cooperative Weed Management Area, 2001-2006 Operating Plan for Agreement #01-CA-11041330-003 between Lemhi Cooperative Weed Management Area and USDA, Forest Service, Salmon Challis National Forest. Salmon, Idaho.

U.S. Forest Service. 2001f. Schedule of Proposed Action. http://www.fs.fed.us/r4/sc. May 6, 2002.

U.S. Forest Service. 2002a. Gibbonsville Draft Environmental Assessment.

U.S. Forest Service. 2002b. Draft Programmatic Biological Assessment of Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest on Snake River Spring/Summer Chinook Salmon, Snake River Steelhead, and Columbia River Bull Trout and Programmatic Biological Evaluation for Westslope Cutthroat Trout.

U.S. Forest Service. 2002c. Programmatic Biological Assessment of Effects of 2002 Non-Chemical Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest on Snake River Spring/Summer Chinook Salmon, Snake River Steelhead, and Columbia River Bull Trout and Programmatic Biological Evaluation for Westslope Cutthroat Trout.

U.S. Forest Service. 2002d. Salmon-Challis National Forest Noxious Weed Management Program Draft Environmental Impact Statement.

USFWS. 1985. Sensitive species management plan for the Western Yellow-billed Cuckoo. USFWS, Region 1.

USFWS. 1994. Reintroduction of gray wolves to Yellowstone National Park and central Idaho. Final Environmental Impact Statement, Helena, Montana. 608 p.

USFWS. 2000. Biological Opinion on the Effects of National Forest Land and Resource Management Plans and Bureau of Land Management Land Use Plans on Canada lynx (*Lynx Canadensis)* in the contiguous United States.

USFWS, National Marine Fisheries Service, Plum Creek Timber Company, and CH2M HILL. 2000. *Final Environmental Impact Statement and Native Fish Habitat Conservation Plan, Proposed Permit for Taking of Federally Listed Native Fish Species on Plum Creek Timber Company, Inc., Lands.* Boise, Idaho.

Verner, J. 1994. Current management situation: flammulated owls. *In*: Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. USDA-Forest Service, GTR-RM-253. 213 p.

Wallen, R. L., and C. R. Groves. 1989. Distribution, breeding biology, and nesting habitat of harlequin ducks in northern Idaho. Unpublished Report. Idaho Department of Fish and Game, Boise, ID.

Wallestad, R. O. and D. B. Pyrah. 1974. Movement and nesting of sage grouse hens in central Montana. Journal of Wildlife Management 38:630-633.

Wallestad, R. O., J. G. Peterson, and R. L. Eng. 1975. Foods of adult sage grouse in central Montana. Journal of Wildlife Management. 39(3): 628-630.

Walker, R. and F. L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. http://www.esri.com/library. May 6, 2002.

Wakkinen, W. L. 1990. Nest site characteristics and spring-summer movements of migratory sage grouse in southeastern Idaho. Thesis, University of Idaho, Moscow, Idaho, USA.

Wardle, D. A., K. S. Nicholson, and A. Rahman. 1993. Influence of plant age on the allelopathic potential of nodding thistle (*Carduus nutans* L.) against pasture grasses and legumes. Weed Res. 33:69-78.

Watson, A. K. and A. J. Renney. 1974. The biology of Canadian weeds.6. *Centaurea diffusa* and *C. maculosa*. Canadian Journal of Plant Science 54:687-701.

Watson, V. J., P. M. Rice, and E. C. Monnig. 1989. Environmental fate of picloram used for roadside weed control. Journal of Environmental Quality 18:198-205.

Wauchope, R. D., T. M. Buttler, A. G. Hornsby, P. W. M. Augustijn Beckers, and J. P. Burt. 1992. SCS/ARS/CES pesticide properties database for environmental decision-making. Review of Environmental Contamination and Toxicology 123:1-157.

Wegner, D. S-CNF Wildlife Biologist, personal communication.

Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho. 42pp.+ appendices. Available from P.O. Box 25, Boise, ID 83707.

Werner, P. A. and L. D. Soule. 1976. The biology of Canadian weeds. 18. *Potentilla recta* L., *Potentilla norvegica* L., and *Potentilla argentea* L. Canadian Journal of Plant Science 56: 591-603.*t*.

White, S. M., J. T. Flinders, and B. L. Welch. 1982. Preference of pygmy rabbits (*Brachylagus idahoesis*) for various populations of big sagebrush (*Artemisia tridentata).*

Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, and R. Parker. 1999. Weeds of the west. Pioneer of Jackson Hole, Jackson, WY. 630 p.

WHO 2002. Global Assessment of the State of the Science of Endocrine Disruption. World Health Organization, 2002. http://www.who.int/pcs/emerg_site/edc/global_edc_TOC.htm

Willard, E. E., D. Bedunah, and L. Marcum. 1988. Impacts and potential impacts of spotted knapweed (*Centaurea maculosa*) on forest and range lands in western Montana. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, MT. 2001.

Wisconsin Master Gardener Program. 2002. Corn Gluten Meal: A Natural Herbicide. http://www.hort.wisc.edu/mastergardener/Features/weeds/corngluten/corngluten.htm. June 2, 2002.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, [and others] 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Volumes 1 – 3. Gen. Tech. Rep. PNW-GTR-485. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 3 vol. (Quigley, Thomas M., tech. Ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Woodward, D. F. 1976. Toxicity of the herbicides dinoseb and picloram to cutthroat trout (*Salmo clarki*) and lake trout (*Salvelinus namaycush*). J. Fish. Res. Bd. Can. 33:1671-1676.

Woodward, D. F. 1979. Assessing the hazard of picloram to cutthroat trout. J. Range Management. 32:230-232.

Wright, M. and R. E. F. Escano. 1986. Montana bald eagle nesting habitat: a macro habitat description. USDA Forest Service. Wildlife and Fish Habitat Relationship Program. Missoula, MT. 240 pp.

Yeo, J. J. and C. R. Peterson. 1998. Amphibian and Reptile Distribution and Habitat Relationships in the Lost River Mountains and Challis-Lemhi Resource Areas. Idaho Bureau of Land Management Technical Bulletin No. 98-10.

Youngblood, A. P., W. G. Padgett, and A. H. Winward. 1985. Riparian community type classification of northern Utah and adjacent Idaho. Ogden, UT: U.S. Department of Agriculture.

Zimmerman, J. A. C. 1996. Ecology and distribution of *Linaria vulgaris* (L.) Miller, Scrophulariaceae. USGS Biological Resources Division, Colorado Plateau Field Station-Flagstaff, Arizona.

Appendix A

USDA Forest Service, Region 4 Best Management Practices for Weed Prevention and Management

APPENDIX A

USDA Forest Service, Region 4, Best Management Practices for Weed Prevention and Management

Forest Service Manual, Ogden, UT
Title 2000—National Forest Resource Management
R4 Supplement No. 2000-00-1
Effective XXXXXX, 2000

POSTING NOTICE. Supplements are numbered consecutively by Title and calendar year. Post by document name. Remove entire document and replace with this supplement. Retain this transmittal as the first page of this document. This is the first supplement to this Title.

Document Name	Superseded (Number of Pages)	New (Number of Pages)
2080	3	11

Digest:

2081.2—Adds Best Management Practices for Noxious Weed prevention and management.

JACK BLACKWELL
Regional Forester

2081.2—Prevention and Control Measures

1. Carry out the noxious weed program with an integrated pest management approach considering the following priorities:

   a. Priority I—Potential New Invaders. Emphasis on education, awareness and prevention of noxious weed species that do not yet occur on National Forest System lands. Since a public awareness program is Priority I, Forest should prepare a Public Involvement Plan.

      (1) Conduct a continuing education and awareness program to train Forest Service personnel and public land users to recognize Priority I weeds. This should include: noxious weed herbarium specimens, photographs of noxious weed species, distribution of published reports, and so forth.

      (2) On an annual basis, share information on the weed treatment programs and established priorities with county weed control associations and other interested groups.

      (3) When a Priority I weed has invaded the forest, place it in Priority II and take appropriate action as described below.

   b. Priority II—Eradication of New Invaders. Highest treatment priority is eradication of new invading noxious weed species. Treatment must emphasize preventing conditions that allow them to become established. Eradication is the goal for these weeds. Components of this treatment priority include:

      (1) Give highest priority in funding to control efforts on new invaders.

      (2) Take isolation and eradication measures as soon as new invaders are identified. Take immediate measures to prevent the species from going to seed.

      (3) Coordinate new infestation surveys with adjacent landowners.

      (4) Identify and treat the cause of new weed infestations to reduce re-entry possibilities.

   c. Priority III—Established Infestations.

      (1) Emphasize containing and preventing further spread.

(2) Give special treatment considerations to breakouts from established stands and along routes of spread, or adjacent to private lands.

(3) Control methods should consider the practicality/cost effectiveness of the method compared to the likelihood of success.

(4) Emphasize biological control where successful agents are available.

(5) Direct emphasis toward species agreed to in local weed management areas, Memorandums of Understanding, and/or cooperative agreements with weed management partners.

2. Stop the spread of existing noxious weed infestations and prevent invasion of new sites or new noxious weeds by applying the following recommended prevention and control mitigation measures (best management practices for noxious weeds).

a. Incorporate noxious weed prevention into all project layout, design, and alternative evaluation.

(1) Environmental analyses will consider noxious weed risk in evaluating project location and design and development of alternatives and mitigating measures, including any or all of the following, as determined to be appropriate by the Forest Officer in charge:

(a) The presence of existing noxious weed infestations within the project site by species and magnitude,

(b) The vulnerability of the habitat type to noxious weed invasion,

(c) The risk for invasion or spread of noxious weeds that could be caused by the project,

(d) The evaluation of alternatives for noxious weed-free and/or low-risk sites for project implementation,

(e) The evaluation of alternative implementation methods which would reduce risk of invasion or spread of noxious weeds,

(f) Provide mitigation measures designed to minimize risk of invasion or spread of noxious weeds,

(g) The evaluation of direct, indirect, and cumulative effects to noxious weed species and populations. Soil disturbance activities will include noxious weed prevention measures.

b. Project implementation for all ground-disturbing operations within noxious weed infested areas will include provisions for monitoring and inspecting for at least one and preferably two growing seasons following operations. Ground-disturbing operations include, but are not limited to: range seedings, timber harvest, reforestation, wildlife browse plantings, road construction, and fire-burned areas and staging areas.

(1) Ground disturbing operations within noxious weed infested areas must comply with mitigation measures recommended by the Ranger District Weed Specialist and approved by the Responsible Forest Officer.

(2) Select noxious weed-free project construction staging areas.

(3) Retain shade in areas that will have ground disturbance to suppress noxious weeds.

(a) Except when removal is required for public safety, minimize the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance, particularly on southerly aspects.

(4) Re-establish vegetation on bare ground (caused by ground-disturbing activities) to minimize noxious weed spread.

(a) For all ground-disturbing activities in noxious weed areas, seed all disturbed soil in a manner that optimizes plant establishment for that specific site—unless ongoing disturbance at the site will prevent noxious weed establishment or spread. Monitor and re-seed as needed until site is successfully revegetated according to project standards.

Exceptions to this mitigation measure will require monitoring and treatment of invading noxious weeds. <u>Exceptions</u> include:

- Grading and blading of travel ways, borrow ditches, rights-of-way, and drainage ways on system roads which are routinely maintained.
- Areas where management objectives would be adversely affected by seeding grass species; i.e.: reforestation plantations.

(b) Where practical, weed seed free topsoil should be stockpiled and replaced on disturbed areas such as road embankments, cuts, fills, and shoulders; gravel pits; skid trails; landings; staging areas; etc.

(c) Replanting should be done immediately after the disturbance activity to take advantage of the seedbed and to establish desirable species before the arrival of invading noxious weeds. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. Seed will be certified weed-seed free before purchase to ensure minimum noxious weed content.

(d) Use local seeding guidelines for detailed procedures and appropriate mixes. If the risk for invasion by noxious weeds is high, use aggressive, early season species. If the risk is low,

use a more diverse mixture of native species that may take longer to establish. Include natives, pioneer species and/or nurse crops. Select for low nutrient demanding species to reduce the need for fertilization. Monitor all seeded sites. Spot re-seed as needed.

(5) Consider the following restoration practices for disturbed areas:

(a) Applying weed-seed free mulch with seeding,

(b) Surface scarification in the form of extreme surface roughening,

(c) Seeding at double the standard rate at initial ground disturbance, and full rate again at the end of the project,

(d) Limiting the use of fertilizer where it would favor noxious weed growth.

(6) Use only weed-seed free straw and mulch on road stabilization and erosion control projects.

(7) Minimize the movement of existing and new noxious weed species caused by moving infested gravel and fill material.

(a) Do not establish new material sources on sites where noxious weeds are present, unless the site has first been treated for eradication and the top 8" of contaminated material is stripped and stockpiled.

(b) All active gravel and borrow sources must be inspected and determined to be noxious weed free, and if noxious weed-infested, stripping and stockpiling of contaminated material must be implemented before material use and transport.

(c) Monitor the area where pit material from treated noxious weed-infested pit sites is used to ensure that any noxious weeds transported to that site are detected early and treated for eradication.

c. Minimize roadside sources of noxious weed seed that could be transported to other areas, and maximize effectiveness of weed control.

(1) Ranger District noxious weed prevention and control programs should include a monitoring plan for annual inspection of system roads and rights-of-way for invasion of noxious weeds. If noxious weeds become established, inventory and schedule for treatment.

(2) Blading or pulling of noxious weed-infested roadsides or ditches must be scheduled and coordinated with the Ranger District Weed Specialist to ensure that appropriate mitigation measures are applied. Roadsides and ditches which are infested with noxious weeds will not

be bladed or pulled on a routine maintenance schedule unless it is required for public safety or protection of the roadway.

(3) When necessary to blade noxious weed infested roadsides or ditches, schedule for spring or early summer prior to the seed-set stage or later in the fall after seeds have fallen. Minimize surface disturbance and isolate bladed material to the infested site.

d. Reduce noxious weed establishment in obliteration/reclamation projects.

(1) Treat noxious weeds in obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as necessary.

e. Minimize transport and establishment of noxious weeds on NFS lands.

(1) Treat noxious weeds at trailheads, boat launches, outfitter and public campsites, airstrips, and roads leading to trailheads.

(2) Forest Service recommendations for remediation by any OHV or equipment user who is convicted of incorrect use which results in detrimental loss of vegetation and/or soil disturbance defined by detrimental displacement or clearly identifiable ruts with berms will include revegetation of disturbed areas.

(3) Infestations of noxious weeds will be closed to camping until noxious weeds have been eradicated.

(4) Campgrounds, trail heads, and similar areas that are open to public vehicle use are considered as high-risk areas and should be inspected annually for invasion of noxious weeds. Established infestations must be included in strategies for eradication.

(5) Remove seed sources that could be picked up by passing vehicles to limit seed transport.

f. Increase noxious weed awareness and prevention efforts among forest users.

(1) Use education programs to increase noxious weed awareness and prevent noxious weed spread by recreationists.

(2) Post and enforce the statewide noxious weed-free feed Order.

(3) Post pictures and descriptions of noxious weeds at NFS trailheads and at roadsides in noxious weed areas to inform recreationists of noxious weed presence and dangers of spreading.

(4) Post prevention practices at NFS trailheads and at roadsides in noxious weed areas. Recommended prevention practices include:

(a) Pack and saddle stock should be fed only weed-seed free feed for several days prior to traveling off roads in the Forest and should be brushed to remove any noxious weed seed.

(b) Stock should be tied and held in the back country in such a way as to minimize soil disturbance and avoid loss of native/desirable vegetation.

(c) Motorized trail users should inspect and clean their vehicles prior to using NFS lands.

(5) Post notices in publicly accessible noxious weed treatment areas where and when there is a likelihood of contact with herbicide-treated-vegetation.

g. Reduce noxious weed establishment and spread at archeological excavations.

(1) Archeological excavation areas are considered as high-risk areas and should be inspected for invasion of noxious weeds. If noxious weeds become established, they must be inventoried and scheduled for treatment.

h. Ensure noxious weed prevention and control are considered in management of wildlife and fisheries.

(1) Ranger District noxious weed prevention and control programs should include a monitoring plan for inventory and annual inspection of areas where wildlife concentrate in the winter and spring which results in overuse and/or soil scarification. If noxious weeds become established, they must be inventoried and scheduled for treatment.

(2) Ranger District noxious weed prevention and control programs should include a monitoring plan for early detection of noxious weed spread or establishment in riparian areas, particularly from existing infestations and previously eradicated sites. New infestations must be treated for eradication before they become well-established.

i. Ensure noxious weed prevention and control are considered in management of all grazing allotments.

(1) Annual Operating Plans for every grazing allotment should include noxious weed prevention monitoring and reporting direction and provisions for annual inspection of areas where livestock concentrate which results in overuse and/or soil scarification. If noxious weeds become established, they must be inventoried and scheduled for treatment.

(2) For each grazing allotment containing noxious weed infestations, include direction in the Annual Operating Plan (AOP) for prevention and control of noxious weeds. Items to be addressed in the AOP may include: season of use, exclusion, minimizing ground disturbance, noxious weed seed transportation, maintaining healthy vegetation, control methods, revegetation, monitoring, reporting and education.

(3) Minimize ground disturbance and bare soil caused by livestock operations.

(a) Include ways to minimize ground disturbance in Allotment Management Plans (AMPs) and/or Annual Operating Plans (AOPs) (e.g. salt licks, watering sites, yarding/loafing areas, corrals and other heavy use areas).

(4) Minimize transport of noxious weed seed into and within allotments.

(a) Avoid driving, walking, riding, and/or herding through noxious weed infestations.

(b) Where and when practical, schedule entry of livestock in units with noxious weed infestations to be for pre seed-set or after seed has fallen. Fence or exclude noxious weed sites, until noxious weeds are eradicated, if scheduling is impractical or unmanageable.

(c) Entry units grazed by livestock transported onto the Forest from noxious weed-infested areas should be inspected annually for new noxious weeds. If noxious weeds become established, they must be inventoried and scheduled for treatment.

(5) Maintain healthy desirable vegetation that is resistant to noxious weed establishment.

(a) Manage forage utilization to maintain the vigor of desirable plant species as described in the Allotment Management Plan.

(b) Minimize and/or exclude grazing on restoration areas until vegetation is well established.

(6) Promote noxious weed awareness and prevention efforts among range permittees.

(a) Use education programs and/or Annual Operating Plan direction to increase noxious weed awareness and prevent noxious weed spread by permittees' livestock and/or management activities.

(b) Encourage permittees who are certified herbicide applicators to participate in allotment noxious weed control programs.

j. Minimize the creation of sites suitable for noxious weed establishment during timber harvest.

(1) Avoid driving, walking, skidding, landing, and/or hauling through noxious weed infestations.

(2) Minimize soil disturbance by considering winter skidding; broadcast burning over pile burning; smaller slash piles and burning under

conditions that minimize heat transfer to the soil; minimizing fire line construction; seeding skid trails, landings and other disturbed sites.

(3) Monitor for noxious weeds after sale activity and treat noxious weeds as needed.

(4) Timber sale and logging areas are considered as high-risk areas and should be inspected for invasion of noxious weeds. If noxious weeds become established, they must be inventoried and scheduled for treatment.

k. Minimize noxious weed establishment in mining operations and reclamation.

(1) Retain sufficient bonding until an appropriate percent of the potential vegetation ground cover, as determined by the Responsible Forest Officer, for the site is reestablished.

(2) Mining and mineral exploration areas are considered as high-risk areas and should be inspected for invasion of noxious weeds. If noxious weeds become established, they must be inventoried and scheduled for treatment.

l. Integrate noxious weed prevention and management in all soil and watershed and stream restoration projects.

(1) Ranger District noxious weed prevention and control programs should include a monitoring plan for early detection of noxious weed spread or establishment in riparian areas, particularly from existing infestations and previously eradicated sites. New infestations must be treated for eradication before they become well-established.

m. Reduce noxious weed establishment and spread in special use permits and easements.

(1) Holders of special use permits and easements shall be responsible for the prevention and control of noxious weeds on the area authorized when prescribed by the Forest Service.

(2) Require noxious weed prevention and control requirements in Operating and Maintenance Plans when authorized activities present a high risk for invasion by noxious weeds or the location of the activity is vulnerable to invasion by noxious weeds.

n. Mitigate and reduce noxious weed spread during wild fire and prescribed fire operations.

(1) Increase noxious weed awareness among fire personnel.

(a) Include noxious weed risk factors and noxious weed prevention considerations in the Resource Coordinator duties on all Incident Overhead Teams and Fire Rehabilitation Teams.

(2) Where practical and timely, establish fire camps, vehicle and crew staging areas, helibases, helispots, cargo and net loading areas, and airstrips in noxious weed-free areas.

(3) Assign a local Weed Specialist Resource Advisor to the IC Team when the wild fire or control operations occurs in or near a noxious weed area.

(4) When noxious weed infested areas are used for fire operations, mitigation measures, as determined by the Weed Specialist Resource Advisor, must be fully implemented. Flag off high-risk noxious weed infestations in areas of fire operations.

(5) All vehicles sent off Forest for fire assistance in noxious weed infested areas should be cleaned before returning to home units.

(6) Emphasize Minimal Impact Suppression Tactics (MIST) to reduce soil and vegetation disturbance. Minimize fire and dozer line.

(7) Avoid or minimize all types of travel through noxious weed-infested areas.

(8) Avoid ignition and burning in noxious weed areas unless it is part of a noxious weed control strategy.

(9) Avoid ignition and burning in areas with a high risk for invasion of noxious weeds.

(10) Unplanned burning of noxious weed areas will require post treatment of noxious weed infestations.

(11) Utilize noxious weed-free helibases and helispots for aerial ignition projects.

(12) Minimize fireline and soil disturbance.

(a) Encourage desirable vegetation during fire rehabilitation activities.

(b) Seed the entire burn, all cat lines, and severely disturbed areas when there is a high risk of noxious weed spread or invasion and such action is recommended by the local Weed Specialist Resource Advisor and approved by the Responsible Forest Officer. Hand seed catlines and severely disturbed areas.

(c) Prioritize treatment of noxious weeds on fire access roads as part of rehabilitation plan to reduce noxious weed spread into burned areas.

(13) Apply for restoration funding for noxious weed infestations as determined by Burned Area Rehabilitation teams.

o. Ensure all Forest Service administrative sites are noxious weed free.

(1) Apply noxious weed treatment and prevention on all Forest Service administrative sites including Ranger Stations, trailheads, campgrounds, pastures, interpretive and historic sites.

(2) Ensure all Forest Service employees are aware of and knowledgeable about noxious weeds.

(a) Encourage noxious weed awareness, education, and identification in employee development and training plans.

p. Ensure continuity in noxious weed management programs.

(1) Each unit will have a Weed Specialist who is trained and proficient in noxious weed management.

3. Treat poisonous plants only where there is a need identified through a site-specific EA, and only where a substantial livestock loss or an imminent threat to human exists.

4. Hay products may be accepted from any State Department of Agriculture, County Agriculture Officer, or their authorized agents, on National Forest System lands that have non-certified hay, feed, and straw closure orders in effect. Pelletized feed do not fall under the hay products closure orders.

5. Use of Sale Improvement Funds to Control Noxious Weeds. Where logging activity on planned or existing timber sales may contribute to the encroachment of noxious weeds, Sale Area Improvement and K-V collection modified to include provision for collection of funds to control or prevent the encroachment of noxious weeds within sale areas as provided for in FSM 2477. Enter planned expenditure of K-V funds for noxious weed control on Development and Budget System Plan.

2083—Information Collection and Reporting

Inventory noxious weeds and plot their location on a legible map(s). Update the inventory annually and coordinate with local/county weed boards. Inventory information can be supplemental to post-treatment evaluation described in FSM 2155.1. Make the inventory and summarize by weed species and acreage infested. Do not duplicate the acreage count where more than one weed species occurs on the same site.

Appendix B

Number and Inventoried Acres (as of 2001) of Weed Infestations on the Salmon-Challis National Forest by Weed Species, Size of Infestation, Ranger District, and Hydrologic Unit Codes (HUCs) 4 and 5

Appendix B

Number and Inventoried Acres (as of 2001) of Weed Infestations on the Salmon-Challis National Forest by Weed Species, Size of Infestation, Ranger District, and Hydrologic Unit Codes (HUCs) 4 and 5 [(1)]

	Size of Infestation									
	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
Weed Species	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Challis Ranger District										
Dalmatian toadflax										
HUC4: Pahsimeroi										
HUC5: Middle Pahsimeroi	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
Total Dalmatian toadflax	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
Leafy spurge										
HUC4: Pahsimeroi										
HUC5: Middle Pahsimeroi	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
HUC4: Upper Salmon										
HUC5: Challis Creek	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
Total Leafy spurge	2	0.20	1	5.00	0	0.00	0	0.00	3	5.20
Musk thistle										
HUC4: Pahsimeroi										
HUC5: Big Creek	0	0.00	1	3.82	1	18.54	1	41.06	3	63.42
HUC5: Lower Pahsimeroi	1	0.10	0	0.00	0	0.00	1	37.92	2	38.02
HUC5: Middle Pahsimeroi	0	0.00	1	5.00	1	6.12	1	366.79	3	377.91
HUC4: Upper Salmon										
HUC5: Challis Creek	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
HUC5: Morgan Creek	0	0.00	1	2.13	0	0.00	0	0.00	1	2.13
Total Musk thistle	1	0.10	4	15.95	2	24.67	3	445.76	10	486.48
Spotted knapweed										
HUC4: Middle Salmon - Panther										
HUC5: Hat Creek	0	0.00	0	0.00	2	31.39	1	292.75	3	324.14
HUC4: Pahsimeroi										
HUC5: Middle Pahsimeroi	1	0.10	0	0.00	2	23.83	0	0.00	3	23.93
HUC4: Upper Salmon										
HUC5: Challis Creek	0	0.00	0	0.00	1	5.48	3	126.18	4	131.66
HUC5: Morgan Creek	2	1.06	1	4.05	4	57.12	2	83.08	9	145.31
Total Spotted knapweed	3	1.16	1	4.05	9	117.82	6	502.01	19	625.04

Size of Infestation

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Yellow toadflax										
HUC4: Upper Salmon										
HUC5: Morgan Creek	1	0.10	1	1.00	0	0.00	0	0.00	2	1.10
Total Yellow toadflax	1	0.10	1	1.00	0	0.00	0	0.00	2	1.10
Leadore Ranger District										
Black henbane										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	4	1.48	1	1.20	1	9.67	0	0.00	6	12.36
HUC5: Hayden	4	1.04	1	3.79	0	0.00	0	0.00	5	4.83
HUC5: Tendoy	1	0.36	1	1.71	0	0.00	0	0.00	2	2.07
Total Black henbane	9	2.88	3	6.70	1	9.67	0	0.00	13	19.25
Canada thistle										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	11	3.49	8	22.56	3	21.73	1	26.20	23	73.98
HUC5: Hayden	7	4.09	4	6.64	0	0.00	0	0.00	11	10.73
HUC5: Lower Lemhi	7	2.41	3	7.54	1	5.48	0	0.00	11	15.44
HUC5: Middle Lemhi	9	5.15	3	5.00	2	26.80	0	0.00	14	36.95
HUC5: Tendoy	0	0.00	0	0.00	1	13.69	0	0.00	1	13.69
Total Canada thistle	34	15.14	18	41.74	7	67.70	1	26.20	60	150.78
Dyer's woad										
HUC4: Lemhi Basin										
HUC5: Hayden	1	0.16	0	0.00	0	0.00	0	0.00	1	0.16
Total Dyer's woad	1	0.16	0	0.00	0	0.00	0	0.00	1	0.16
Hoary cress - Whitetop										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	1	0.25	0	0.00	0	0.00	0	0.00	1	0.25
Total Hoary cress - Whitetop	1	0.25	0	0.00	0	0.00	0	0.00	1	0.25
Leafy spurge										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	60	7.78	22	32.64	1	11.59	0	0.00	83	52.01
HUC5: Middle Lemhi	6	0.60	2	2.00	0	0.00	0	0.00	8	2.60
Total Leafy spurge	66	8.38	24	34.64	1	11.59	0	0.00	91	54.61

	Size of Infestation									
	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
Weed Species	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Musk thistle										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	10	4.10	9	17.59	9	114.27	0	0.00	28	135.96
HUC5: Hayden	26	9.82	6	8.93	2	28.60	1	43.56	35	90.90
HUC5: Lower Lemhi	14	3.79	11	29.41	4	32.66	1	33.20	30	99.06
HUC5: Middle Lemhi	8	3.33	10	21.15	3	38.10	0	0.00	21	62.58
HUC5: Tendoy	2	1.08	1	3.18	1	18.83	1	30.05	5	53.14
Total Musk thistle	60	22.12	37	80.25	19	232.45	3	106.81	119	441.63
Spotted knapweed										
HUC4: Lemhi Basin										
HUC5: Eighteen Mile	21	7.30	15	37.19	13	137.09	0	0.00	49	181.58
HUC5: Hayden	8	3.29	12	25.85	12	169.65	3	184.42	35	383.22
HUC5: Lower Lemhi	3	1.55	2	5.85	4	62.16	0	0.00	9	69.56
HUC5: Middle Lemhi	12	5.10	10	24.02	6	52.10	2	116.07	30	197.28
HUC5: Tendoy	2	0.29	4	9.07	3	37.88	0	0.00	9	47.25
HUC5: Timber Creek	3	1.26	2	6.81	3	36.02	1	35.78	9	79.87
Total Spotted knapweed	49	18.81	45	108.79	41	494.89	6	336.28	141	958.76
Lost River Ranger District										
Black henbane										
HUC4: Big Lost										
HUC5: Arco	3	0.73	0	0.00	0	0.00	0	0.00	3	0.73
HUC5: Mackay	7	2.87	0	0.00	0	0.00	0	0.00	7	2.87
HUC5: North Fork Big Lost River	15	6.99	0	0.00	0	0.00	0	0.00	15	6.99
HUC5: Willow Creek	16	7.24	0	0.00	0	0.00	0	0.00	16	7.24
HUC4: Little Lost										
HUC5: Middle Little Lost	6	1.19	0	0.00	0	0.00	0	0.00	6	1.19
HUC5: Upper Little Lost	2	0.59	0	0.00	1	5.13	0	0.00	3	5.72
Total Black henbane	49	19.60	0	0.00	1	5.13	0	0.00	50	24.73
Bull thistle										
HUC4: Big Lost										
HUC5: Willow Creek	41	16.04	0	0.00	0	0.00	0	0.00	41	16.04
HUC4: Little Lost										
HUC5: Middle Little Lost	7	1.46	0	0.00	0	0.00	0	0.00	7	1.46
HUC5: Upper Little Lost	197	42.43	5	9.17	0	0.00	0	0.00	202	51.59
Total Bull thistle	245	59.93	5	9.17	0	0.00	0	0.00	250	69.09

Size of Infestation

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Canada thistle										
HUC4: Big Lost										
HUC5: Antelope Creek	0	0.00	3	5.72	1	15.82	0	0.00	4	21.54
HUC5: East Fork Big Lost River	44	13.17	0	0.00	0	0.00	0	0.00	44	13.17
HUC5: Mackay	30	9.55	0	0.00	0	0.00	0	0.00	30	9.55
HUC5: North Fork Big Lost River	5	1.47	0	0.00	0	0.00	0	0.00	5	1.47
HUC4: Little Lost										
HUC5: Middle Little Lost	24	7.27	0	0.00	0	0.00	0	0.00	24	7.27
HUC5: Upper Little Lost	158	37.75	0	0.00	0	0.00	0	0.00	158	37.75
Total Canada thistle	261	69.21	3	5.72	1	15.82	0	0.00	265	90.75
Hoary cress - Whitetop										
HUC4: Big Lost										
HUC5: Arco	0	0.00	1	1.78	0	0.00	0	0.00	1	1.78
HUC5: East Fork Big Lost River	4	2.11	2	2.35	0	0.00	0	0.00	6	4.45
Total Hoary cress - Whitetop	4	2.11	3	4.13	0	0.00	0	0.00	7	6.23
Leafy spurge										
HUC4: Big Lost										
HUC5: Antelope Creek	29	9.46	17	31.76	1	14.73	0	0.00	47	55.95
HUC5: Arco	14	5.15	8	17.49	1	9.79	0	0.00	23	32.43
HUC5: East Fork Big Lost River	0	0.00	1	3.42	0	0.00	0	0.00	1	3.42
HUC5: Mackay	24	8.27	20	57.13	2	13.58	2	60.14	48	139.12
HUC5: Willow Creek	5	2.60	5	16.46	4	33.50	0	0.00	14	52.56
HUC4: Little Lost										
HUC5: Lost Little Sinks	0	0.00	4	6.16	1	14.38	0	0.00	5	20.53
HUC5: Lower Little Lost	0	0.00	1	3.97	0	0.00	0	0.00	1	3.97
Total Leafy spurge	72	25.49	56	136.37	9	85.99	2	60.14	139	307.98
Musk thistle										
HUC4: Big Lost										
HUC5: Antelope Creek	5	1.88	0	0.00	0	0.00	0	0.00	5	1.88
HUC5: Mackay	5	1.55	3	4.94	1	5.40	0	0.00	9	11.89
Total Musk thistle	10	3.43	3	4.94	1	5.40	0	0.00	14	13.77

	Size of Infestation									
	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
Weed Species	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Spotted knapweed										
HUC4: Big Lost										
HUC5: Antelope Creek	10	3.08	0	0.00	0	0.00	0	0.00	10	3.08
HUC5: Arco	0	0.00	1	1.58	0	0.00	0	0.00	1	1.58
HUC5: East Fork Big Lost River	10	2.29	0	0.00	0	0.00	0	0.00	10	2.29
HUC5: Mackay	6	2.15	2	3.37	0	0.00	0	0.00	8	5.52
HUC5: North Fork Big Lost River	4	1.20	0	0.00	0	0.00	0	0.00	4	1.20
HUC5: Willow Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC4: Little Lost										
HUC5: Middle Little Lost	7	2.60	0	0.00	0	0.00	0	0.00	7	2.60
HUC5: Upper Little Lost	13	3.56	0	0.00	0	0.00	0	0.00	13	3.56
Total Spotted knapweed	51	14.98	3	4.95	0	0.00	0	0.00	54	19.93
Yellow toadflax										
HUC4: Big Lost										
HUC5: Mackay	3	1.13	0	0.00	0	0.00	0	0.00	3	1.13
Total Yellow toadflax	3	1.13	0	0.00	0	0.00	0	0.00	3	1.13
Middle Fork Ranger District										
Spotted knapweed										
HUC4: Upper Middle Fork Salmon										
HUC5: Upper Loon Creek	3	1.11	3	7.20	2	16.71	0	0.00	8	25.02
Total Spotted knapweed	3	1.11	3	7.20	2	16.71	0	0.00	8	25.02
North Fork Ranger District										
Black henbane										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
Total Black henbane	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
Bull thistle										
HUC4: Middle Salmon - Panther										
HUC5: Shoup	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Bull thistle	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Canada thistle										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	1	0.10	2	6.00	0	0.00	0	0.00	3	6.10
HUC5: North Fork	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Shoup	7	1.26	4	4.24	0	0.00	0	0.00	11	5.50
Total Canada thistle	9	1.46	6	10.24	0	0.00	0	0.00	15	11.70

Size of Infestation

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Common tansy										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	4	0.40	1	1.00	0	0.00	0	0.00	5	1.40
HUC5: North Fork	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Shoup	2	0.20	1	1.00	0	0.00	0	0.00	3	1.20
Total Common tansy	7	0.70	2	2.00	0	0.00	0	0.00	9	2.70
Dalmatian toadflax										
HUC4: Middle Salmon - Panther										
HUC5: North Fork	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Dalmatian toadflax	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Dyer's woad										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Dyer's woad	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Hoary alyssum										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
HUC5: North Fork	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
Total Hoary alyssum	0	0.00	2	10.00	0	0.00	0	0.00	2	10.00
Houndstongue										
HUC4: Middle Salmon - Panther										
HUC5: Indianola	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
HUC5: North Fork	0	0.00	2	2.00	0	0.00	0	0.00	2	2.00
Total Houndstongue	0	0.00	3	3.00	0	0.00	0	0.00	3	3.00
Leafy spurge										
HUC4: Middle Salmon - Chamberlain										
HUC5: Horse Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	9	0.90	5	9.00	0	0.00	0	0.00	14	9.90
HUC5: North Fork	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Shoup	2	0.20	1	1.00	0	0.00	0	0.00	3	1.20
Total Leafy spurge	13	1.30	6	10.00	0	0.00	0	0.00	19	11.30
Musk thistle										
HUC4: Middle Salmon - Panther										
HUC5: North Fork	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
Total Musk thistle	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20

Size of Infestation

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Rush skeletonweed										
HUC4: Middle Salmon - Panther										
HUC5: Colson Owl	5	0.66	0	0.00	0	0.00	0	0.00	5	0.66
Total Rush skeletonweed	5	0.66	0	0.00	0	0.00	0	0.00	5	0.66
Russian knapweed										
HUC4: Middle Salmon - Panther										
HUC5: Colson Owl	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Russian knapweed	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Spotted knapweed										
HUC4: Middle Salmon - Chamberlain										
HUC5: Corn Kitchen	3	0.17	4	10.25	4	50.99	5	665.52	16	726.93
HUC5: Horse Creek	0	0.00	0	0.00	0	0.00	3	852.63	3	852.63
HUC4: Middle Salmon - Panther										
HUC5: Colson Owl	5	1.88	7	20.17	6	73.71	12	6,351.68	30	6,447.44
HUC5: Deadwater	3	1.08	2	3.34	10	114.01	14	3,644.92	29	3,763.35
HUC5: Indianola	4	1.20	4	7.88	9	83.35	10	8,013.25	27	8,105.68
HUC5: North Fork (2)	34	11.40	24	51.79	49	595.02	48	23,645.01	155	24,303.22
HUC5: Red Rock	7	3.19	3	5.51	10	138.49	17	2,406.86	37	2,554.05
HUC5: Shoup (2)	48	13.96	55	126.52	52	620.43	37	7,056.17	192	7,817.08
Total Spotted knapweed	104	32.88	99	225.46	140	1,676.01	146	52,636.02	489	54,570.37
St. Johnswort										
HUC4: Middle Salmon - Chamberlain										
HUC5: Corn Kitchen	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC4: Middle Salmon - Panther										
HUC5: North Fork	3	0.30	0	0.00	0	0.00	0	0.00	3	0.30
Total St. Johnswort	4	0.40	0	0.00	0	0.00	0	0.00	4	0.40
Sulphur cinquefoil										
HUC4: Middle Salmon - Panther										
HUC5: Colson Owl	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
HUC5: North Fork	1	0.10	4	4.00	1	12.02	0	0.00	6	16.12
Total Sulphur cinquefoil	1	0.10	5	9.00	1	12.02	0	0.00	7	21.12
Yellow toadflax										
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	2	0.20	3	7.00	0	0.00	0	0.00	5	7.20
HUC5: North Fork	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Shoup	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
Total Yellow toadflax	5	0.50	3	7.00	0	0.00	0	0.00	8	7.50

	Size of Infestation									
	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
Weed Species	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Salmon/Cobalt Ranger District										
Black henbane										
HUC4: Middle Salmon - Panther										
HUC5: Red Rock	5	0.50	0	0.00	0	0.00	0	0.00	5	0.50
Total Black henbane	5	0.50	0	0.00	0	0.00	0	0.00	5	0.50
Bull thistle										
HUC4: Lower Middle Fork Salmon										
HUC5: Lower Camas Creek	0	0.00	0	0.00	1	13.36	1	38.57	2	51.92
HUC4: Middle Salmon - Panther										
HUC5: Deep-Moyer	1	0.10	1	1.27	0	0.00	0	0.00	2	1.37
HUC5: Red Rock	14	4.11	11	27.84	2	39.31	3	192.17	30	263.43
HUC5: Upper Panther	1	0.46	0	0.00	1	13.27	1	39.05	3	52.78
Total Bull thistle	16	4.67	12	29.11	4	65.94	5	269.78	37	369.50
Canada thistle										
HUC4: Lower Middle Fork Salmon										
HUC5: Lower Camas Creek	0	0.00	1	4.84	0	0.00	0	0.00	1	4.84
HUC4: Middle Salmon - Panther										
HUC5: Deep-Moyer	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
HUC5: Middle Panther Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Napias	0	0.00	1	1.43	0	0.00	0	0.00	1	1.43
HUC5: Red Rock	2	0.20	2	5.47	0	0.00	0	0.00	4	5.67
HUC5: Twelve/Lake	0	0.00	2	2.42	0	0.00	0	0.00	2	2.42
HUC5: Upper Panther	2	0.20	2	8.31	1	11.04	0	0.00	5	19.55
Total Canada thistle	5	0.50	9	23.46	1	11.04	0	0.00	15	35.00
Common tansy										
HUC4: Middle Salmon - Panther										
HUC5: Red Rock	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Common tansy	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Hoary cress - Whitetop										
HUC4: Middle Salmon - Panther										
HUC5: Lower Panther Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Salmon	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Hoary cress - Whitetop	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
Houndstongue										
HUC4: Middle Salmon - Panther										
HUC5: Lower Panther Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Houndstongue	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10

Size of Infestation

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Leafy spurge										
HUC4: Middle Salmon - Panther										
HUC5: Lower Panther Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Napias	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Red Rock	8	0.80	1	1.00	0	0.00	0	0.00	9	1.80
Total Leafy spurge	10	1.00	1	1.00	0	0.00	0	0.00	11	2.00
Musk thistle										
HUC4: Middle Salmon - Panther										
HUC5: Deep-Moyer	0	0.00	0	0.00	1	16.67	0	0.00	1	16.67
HUC5: Napias	3	0.55	1	2.94	0	0.00	1	50.12	5	53.62
HUC5: Red Rock	36	5.65	7	16.53	5	43.68	2	75.40	50	141.27
HUC5: Twelve/Lake	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
Total Musk thistle	39	6.20	9	20.48	6	60.35	3	125.53	57	212.55
Rush skeletonweed										
HUC4: Lower Middle Fork Salmon										
HUC5: Lower Camas Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Yellow Jacket	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC4: Middle Salmon - Panther										
HUC5: Lower Panther Creek	4	0.40	0	0.00	0	0.00	0	0.00	4	0.40
HUC5: Middle Panther Creek	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
HUC5: Upper Panther	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
Total Rush skeletonweed	9	0.90	0	0.00	0	0.00	0	0.00	9	0.90
Scotch thistle										
HUC4: Middle Salmon - Panther										
HUC5: Twelve/Lake	3	0.30	0	0.00	0	0.00	0	0.00	3	0.30
Total Scotch thistle	3	0.30	0	0.00	0	0.00	0	0.00	3	0.30

	Size of Infestation									
	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
Weed Species	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Spotted knapweed										
HUC4: Lower Middle Fork Salmon										
HUC5: Lower Camas Creek	23	7.82	36	94.99	37	421.97	9	521.04	105	1,045.81
HUC5: Upper Camas Creek	0	0.00	0	0.00	3	34.91	0	0.00	3	34.91
HUC5: Yellow Jacket	5	1.05	4	8.97	11	150.44	7	663.35	27	823.81
HUC4: Middle Salmon - Panther										
HUC5: Deadwater	1	0.40	3	5.85	5	47.13	1	39.08	10	92.46
HUC5: Deep-Moyer	55	11.40	22	45.18	16	173.99	6	316.65	99	547.22
HUC5: Hat Creek	1	0.14	2	3.88	2	36.29	3	132.63	8	172.94
HUC5: Iron Creek	0	0.00	2	4.52	10	123.39	6	538.48	18	666.38
HUC5: Lower Panther Creek	16	4.49	19	40.53	21	252.41	8	937.80	64	1,235.24
HUC5: Middle Panther Creek	11	3.71	10	33.26	15	156.34	3	214.09	39	407.41
HUC5: Napias	38	5.20	13	32.11	3	43.11	0	0.00	54	80.42
HUC5: Red Rock	26	6.25	14	28.95	10	115.44	5	388.40	55	539.05
HUC5: Salmon	21	5.66	36	77.62	10	81.19	8	496.05	75	660.51
HUC5: Shoup	10	3.35	3	6.43	0	0.00	0	0.00	13	9.78
HUC5: Twelve/Lake	3	0.80	4	9.58	10	106.06	8	604.13	25	720.58
HUC5: Upper Panther	59	9.22	23	57.71	15	162.08	4	273.09	101	502.11
Total Spotted knapweed	269	59.50	191	449.58	168	1,904.76	68	5,124.79	696	7,538.62
Sulphur cinquefoil										
HUC4: Middle Salmon - Panther										
HUC5: Red Rock	3	0.30	0	0.00	0	0.00	0	0.00	3	0.30
Total Sulphur cinquefoil	3	0.30	0	0.00	0	0.00	0	0.00	3	0.30
Yellow toadflax										
HUC4: Lower Middle Fork Salmon										
HUC5: Upper Camas Creek	0	0.00	0	0.00	1	7.53	0	0.00	1	7.53
HUC4: Middle Salmon - Panther										
HUC5: Iron Creek	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Red Rock	4	0.40	0	0.00	0	0.00	0	0.00	4	0.40
HUC5: Salmon	0	0.00	1	1.00	0	0.00	0	0.00	1	1.00
HUC5: Upper Panther	6	0.93	2	2.00	1	9.05	0	0.00	9	11.99
Total Yellow toadflax	11	1.43	3	3.00	2	16.58	0	0.00	16	21.02
Yankee Fork Ranger District										
Canada thistle										
HUC4: Upper Salmon										
HUC5: Squaw/Slate	0	0.00	1	1.00	1	7.30	1	232.68	3	240.98
Total Canada thistle	0	0.00	1	1.00	1	7.30	1	232.68	3	240.98

Weed Species	<1 Acre		1-5 Acres		>5-25 Acres		>25 Acres		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Spotted knapweed										
HUC4: Upper Middle Fork Salmon										
HUC5: Marsh Creek	2	0.20	0	0.00	0	0.00	0	0.00	2	0.20
HUC4: Upper Salmon										
HUC5: Bayhorse	0	0.00	1	5.00	0	0.00	0	0.00	1	5.00
HUC5: Casino/Basin	1	0.11	1	4.45	1	13.97	0	0.00	3	18.54
HUC5: Squaw/Slate	1	0.02	7	19.43	2	13.03	0	0.00	10	32.47
HUC5: Yankee Fork	1	0.10	4	13.50	1	12.16	1	38.24	7	64.00
Total Spotted knapweed	5	0.43	13	42.38	4	39.16	1	38.24	23	120.21
Tansy ragwort										
HUC4: Upper Salmon										
HUC5: Bayhorse	0	0.00	1	2.81	0	0.00	0	0.00	1	2.81
HUC5: Yankee Fork	0	0.00	1	1.44	0	0.00	0	0.00	1	1.44
Total Tansy ragwort	0	0.00	2	4.25	0	0.00	0	0.00	2	4.25
Yellow toadflax										
HUC4: Upper Salmon										
HUC5: Bayhorse	0	0.00	1	5.00	1	16.39	0	0.00	2	21.39
HUC5: Casino/Basin	1	0.10	0	0.00	0	0.00	0	0.00	1	0.10
HUC5: Squaw/Slate	12	2.49	3	9.07	1	5.99	0	0.00	16	17.56
HUC5: Yankee Fork	0	0.00	2	3.89	0	0.00	0	0.00	2	3.89
Total Yellow toadflax	13	2.59	6	17.96	2	22.38	0	0.00	21	42.94
Grand Total	**1,471**	**383.60**	**585**	**1,345.52**	**423**	**4,903.38**	**245**	**59,904.23**	**2,724**	**66,536.72**

(1) Does not include the Frank Church River of No Return Wilderness.

(2) Some small areas may be the result of geoprocessing polygon features within the GIS. This was done to combine areas and eliminate double counting areas where polygons overlap. For example, smaller areas are created where buffered line polygons cross each other and overlap at the intersection.

Appendix C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
ESTABLISHED INVADERS							
Whitetop (Hoary cress)	*Cardaria draba*	Perennial	Seeds (viable 3 years) and deep creeping roots.	None currently available.	• glyphosate • 2,4-D • chlorsulfuron • metasulfuron New potentially effective: WOW and Scythe.	Presence of competing vegetation, particularly shrubs, vetch, lupine, and other nitrogen-fixing legumes.	Mowing or grazing with sheep or goats during bud stage and again during rebud (follow by herbicide). Hand-pulling or digging must remove all roots and continue for 2 to 5 years to eradicate.
Musk thistle	*Carduus nutans*	Biennial or winter annual	Seeds (prolific seed producer, seeds viable up to 10 years).	• rosette weevil (*Trichosirocalus horridus*) • flea beetle (*Psylliodes chalcomera*) • syrphid fly (*Cheilosia corydon*) • thistle-defoliating beetle (*Cassida rubiginosa*) [The seedhead weevil (*Rhinocyllus conicus*) is not recommended because it attacks some native, rare thistles.]	• glyphosate • 2,4-D • dicamba • piclorarn • metsulfuron methyl • clopyralid • 2,4-D amine + • glyphosate + 2,4-D New potentially effective: WOW and Scythe.	Revegetation for shade.	Mowing before flowering, continuously. Cutting plant below crown.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Spotted knapweed	*Centaurea maculosa*	Biennial or short-lived perennial	Seeds, lateral shoots.	• seed head gall fly (*Urophora affinis*) • seed head gall fly (*U. quadrifasciata*) • seed head moth (*Metzneria paucipunctella*) • black leaf blight fungus (*Alternaria alternata*) • root moth (*Agapeta zoegana*) • verdant seed fly (*Terellia virens*) • root weevil (*Cyphocleonus achates*)	• glyphosate • picloram • 2,4-D • clopyralid + 2,4-D • dicamba clopyralid (not recommended for sites with other weed species) New potentially effective: WOW and Scythe.	Revegetation for shade. Regular cultivation/ seeding. Spring burning.	Hand-pulling of small infestations (usually takes 7 to 10 years).
Canada thistle	*Cirsium arvense*	Perennial	Seeds, shoots from lateral roots (dormant, buried seeds can remain viable for up to 26 years).	• stem-boring beetle (Ceutorhyncus litura) • gall fly (Urophora cardui) • shoot fungus (Sclerotinia sclerotiorum)	• 2,4-D • clopyralid + 2,4-D • clopyralid • dicamba New potentially effective: WOW and Scythe.	Revegetation for shade. Cultivation not recommended.	Removing flowers to prevent seed production.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Bull thistle	*Cirsium vulgare*	Biennial	Seeds.	• gall fly (*Urophora stylata*)	• picloram New potentially effective: WOW and Scythe.	Revegetation for shade (the presence of tall herbs reduces bull thistle seedling survival. When grass growth was reduced by herbicide spraying, bull thistle increased in frequency).	Hand-pulling, mowing, burning, digging will kill if aboveground portions of the plant are completely removed or consumed because It does not sprout from the root crown or root. If 8 inches or more of stem remains alive, it may sprout from remaining portions of the stem.
Leafy spurge	*Euphorbia esula*	Perennial	Seeds, spreading roots.	• flea beetle (*Aphthona abdominalis*) • flea beetle (*Aphthona nigriscutis*) • hawk moth (*Hyles euphorbiae*)	• glyphosate • dicamba • picloram • glyphosate + 2,4-D • piclorarn + 2,4-D	Seeding with sod-forming perennials. Fall burning.	Mowing/cutting before flowering. Cultivation every 14 days. Hand-pulling of small infestations before seed production. Grazing with sheep or goats.
Black henbane	*Hyoscyamus niger*	Annual or biennial	Seeds (seeds viable for 4 years).	None currently available.	• glyphosate		Hand-pulling, mowing, or digging to prevent seed production, must remove tap root to kill the plant. Burning mature plants will kill the seed. Regular cultivation. Toxic to livestock, including sheep.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Cheatgrass	*Bromus tectorum*	Winter annual	Seeds.	None currently available. [Two rhizobacteria, *Pseudomonas fluorescens* (strain D7), and *Pseudomonas syringae* (strain 3366) are under study.]	Spring: • glyphosate Apply in early spring when the plants were 10 cm (3.9 in) high or less and growing vigorously. Fall: • sulfometuron methyl • Apply after fall germination. New potentially effective: WOW and Scythe.	Must revegetate sites that have been disked or sprayed to provide competition.	Cutting is not recommended. Deep disking several times at intervals to bury seeds 4 to 6 inches then overseeding. Shallow disking to initiate seed germination, then either disking again or spraying with glyphosate, followed by broadcast or drill seeding.
Common mullein	*Verbascum thapsus*	Biennial or short-lived perennial	Seeds (one plant can produce 100,000-180,000 seeds with viability up to 100 years).	• mullein seedhead weevil (*Gymnetron tetrum*) Pending approval: mullein moth (*Cucullia verbasci*).	• glyphosate New potentially effective: WOW.	Chickens are successful at eradicating. Cattle and sheep avoid it so decreasing livestock utilization can help native vegetation compete.	Easy to pull in loose soils because of shallow taproot (before flowering). Hand-hoeing or digging also effective. Mow or scythe just before flowering.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
NEW INVADERS							
Hoary alyssum	*Berteroa incana*	Annual, biennial, or short-lived perennial	Seeds.	None currently available.	• glyphosate • 2,4-D New potentially effective: WOW and Scythe.	Presence of competing plants. Seeding and fertilizing.	Hand-pulling or digging.
Russian knapweed	*Centaurea repens* or *Acroptilon repens*	Long-lived perennial (75 years)	Rhizomes (new shoots arise from creeping roots, up to 27 root shoots/ft^2 and roots can reach depths to 23 feet). Relatively few seeds are produced (viable for 2-3 years).	• gall-forming nematode (*Subanguina picridis*) • seed head gall fly (*U. quadrifasciata*) • seed head gall fly (*Urophora affinis*)	• picloram • clopyralid • glyphosate	The healthier the native vegetation, the less susceptible it will be to Russian knapweed invasion. (Once established, it emits allelopathic compounds to inhibit other plants).	Cultivation, cutting/mowing, and/or hand-pulling not recommended unless done three times per year (spring, summer, fall) to force the plants to use nutrient reserve stored in roots, followed by herbicide treatment. This protocol must be followed for at least 3 years otherwise it will stimulate sprouting from rhizomes. It is difficult to remove all roots with a one-time effort. Severed root pieces as small as 2.5 cm can generate new shoots from depths to 15 cm.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Rush skeletonweed	*Chondrilla juncea*	Perennial	Seeds, lateral roots and root fragments.	• gall midge (*Cystiphora schmidti*) • gall mite (*Eriophyes chondrillae*) • rush skeletonweed rust (*Puccinia chondrillina*)	Difficult to control with herbicides. Takes consistent spraying for 3 to 5 years. • 2,4-D • picloram • clopyralid + • dicamba	Heavy seeding rates and fertilizing with nitrogen works best.	Hand-pulling must remove all roots (3 to 6 times per year for 6 to 10 years to eradicate new shoots and seedlings). Mowing not recommended (increase growth from roots). Cultivation and/or digging, if within 5 weeks after germination.
Houndstongue	*Cynoglossum officinale*	Biennial	Seeds, attach to fur and clothing.	None currently available.	• picloram • dicamba (Apply at rosette stage, late summer or early fall.)	Keep and maintain vigorous vegetative cover.	Hand-pull before flowering.
St. Johnswort	*Hypericum perforatum*	Perennial	Seeds and rhizomes.	• beetle (*Agrilus hyperici*) • moth (*Aplocera plagiata*) • beetle (*Chrysolina hyperici*) • beetle (*Chrysolina quadrigemina*) • Klamath weed midge (*Zeuxidiplosis giardi*)	• 2,4-D • picloram (spring) • glyphosate (spring) • metsulfuron methyl Repeated applications necessary.	Maintain competitive, closed-canopy plant community. This species is not shade tolerant.	Hand-pulling or digging of young, isolated plants. Cutting and mowing not recommended, may reduce seed but promotes sprouting from rhizomes. Regular cultivation.
Dyer's woad	*Isatis tintoria*	Winter annual, biennial, or short-lived perennial	Seeds.	• rust (*Puccinia thlaspeos*) [Occurs naturally, not currently approved.]	• 2,4-D • chlorsulfuron		Hand-pulling, cultivation, or digging below the crown before seed production are very effective, must remove crown to prevent resprouting.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Dalmatian toadflax	*Linaria genistifolla ssp. delmatica*	Perennial	Seeds, vegetative growth from lateral root buds (seeds viable 10-15 years).	• toadflax moth (*Calophasia lunula*) • root-boring moths (*Eteobalia intermediella and E. serratella*) • seed capsule-feeding weevils (*Gymnetron antirrhini and G. linariae*) • stem-boring weevil (*Mecinus janthinus*) • ovary-feeding beetle (*Brachypterolus pulicarius*)	Waxy coat typically makes this method ineffective. Two stages of vulnerability: fall rosette stage or when flowering, so root reserves are lower: • glyphosate • dicamba • picloram The preemergent WOW may also be effective.	Toadflax seedling are initially very vulnerable to competition from established, vigorous vegetation. Restrict spring cattle grazing on sites with toadflax to maintain vigorous competition from native species.	Hand-pulling must remove all roots, best in sandy or moist soils (annually, 10 to 15 years to eradicate). Regular cultivation (every 7 to 10 days starting in June, for 2 years). Do not mow.
Yellow toadflax	*Linaria vulgaris*	Perennial	Seeds and creeping lateral roots (seeds viable 10-15 years).	• toadflax moth (*Calophasia lunula*) • root-boring moths (*Eteobalia intermediella* and *E. serratella*) • seed capsule-feeding weevils (*Gymnetron antirrhini* and *G. linariae*) • stem-boring weevil (*Mecinus janthinus*) • ovary-feeding beetle (*Brachypterolus pulicarius*)	• glyphosate (See Dalmatian toadflax.)	Intense competition with native vegetation. Restrict spring cattle grazing on sites with toadflax to maintain vigorous competition from native species.	Hand-pulling must remove all roots (annually, 10 to 15 years to eradicate). Regular cultivation. Do not mow.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Scotch thistle	*Onopordum acanthium*	Biennial	Seeds.	• seed-head weevil (*Rhinocyllus conicus*) • thistle crown-weevil (*Trichosirocalus horridus*)	• glyphosate • picloram • dicamba • 2,4-D • 2,4-D + dicamba	Establish and maintain dense, vigorous native vegetation, especially important to have vegetative cover in the fall when seeds germinate (adjust grazing regimes to avoid late summer/fall rotations).	Digging must cut plant off below soil level, leaving no above-ground biomass.
Sulfur cinquefoil	*Potentilla recta*	Perennial (long-lived)	Seeds (broken roots can regenerate).	• root moth (*Tinthia myrmosae-formis*) • flower-head weevil (*Anthonomus rubripes*)	• picloram (fall) • 2,4-D (spring, rosette stage)	Regular cultivation and reseeding.	Hand-pulling of small infestations (must remove root crown). Regular cultivation. Mowing not recommended.
Tansy ragwort	*Senecio jacobaea*	Biennial (rarely annual or perennial)	Seeds (viable for several years) and can regenerate top-growth when cut.	• seed fly (*Pegohyllemyia seneciella*) • flea beetle (*Longitarsus jacobaeae*) • cinnabar moth (*Tyria jacobaeae*)	• 2,4-D • picloram • dicamba • 2,4-D + dicamba • metsulfuron methyl • clopyralid • clopyralid + 2,4-D Spring is usually the best time to spray.	The healthier the native vegetation, the less likely this plant will become established (needs disturbance to create openings in native vegetation in order to establish).	Mowing just prior to flowering when the plant has exhausted the greatest amount of its stored reserves and before its seeds have started to develop. Although mowing can prevent flowering, it appears to increase rosette density. Hand-pulling small infestations before flowering must remove all roots. Grazing heavy infestations with sheep prior to flowering.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Common tansy	*Tanacetum vulgare*	Perennial	Seeds, rhizomes.	None currently available.	• dicamba + • picloram • metsulfuron methyl	Revegetation for shade.	Hand-pulling not recommended (stimulates sprouting from rhizomes) and must remove all roots. Constant cultivation, otherwise the infestation can increase infestation by chopping roots that sprout. Mowing to reduce seed production. Grazing by sheep and goats.
Field pennycress	*Thlaspi arvense*	Annual/ winter annual	Seeds	None known.	• glyphosate • WOW	Revegetation after site disturbance.	Mowing to reduce seed production. Fall tillage.
Bur buttercup	*Ranunculus testiculatus*	Annual	Seeds.	None known.	• glyphosate	Establish and maintain healthy native vegetation.	Hoeing or cultivation before seeds form.
Blue mustard	*Chlorispera tenella*	Annual/ winter annual	Seeds	None known.	• glyphosate	Revegetation after site disturbance.	Cultivation/tillage in early spring. Mowing in early flowering period.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
POTENTIAL INVADERS							
Jointed goatgrass	*Aegilops cylindrica*	Winter annual	Seeds (viable in soil up to 6 years).	None known.	• glyphosate	Establish and maintain native vegetation.	Spring tillage or hand removal for small outbreaks.
Skeletonleaf bursage	*Ambrosia tomentosa*	Perennial	Seeds and deep creeping rhizomes.	None currently available.	• 2,4-D • picloram		Avoid disking or cultivating as it spreads root fragments.
Diffuse knapweed	*Centaurea diffusa*	Biennial or short-lived perennial	Abundant seed production.	• seed head gall fly (*Urophora affinis*) • seed head gall fly (*U. quadrifasciata*) • peacock fly (*Chaetorellia acrolophi*) • seed head weevil (*Bangasternus fausti*) • root weevil (*Cyphocleonus achates*) • root moth (*Agapeta zoegana*)	• glyphosate • picloram • 2,4-D • clopyralid • clopyralid + 2,4-D • dicamba	Revegetation for shade. Spring burning.	Hand-pulling of small infestations (usually takes 7 to 10 years).
Meadow knapweed	*Centaurea pratensis*	Perennial	Seeds.	• seed head gall fly, (*Urophora quadrifasciata*)	• glyphosate • 2,4-D • picloram • clopyralid	Establish and maintain good vegetation, particularly perennial grasses.	Hand-pulling is effective. Cultivation must be repeated several times a year for several years.

APPENDIX C
Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Yellow starthistle	*Centaurea solstitialis*	Winter annual or biennial	Seeds (up to 10 years dormancy and viability).	• seed head weevil (*Bangastemus orientalis*) • peacock fly (*Chaetorellia australis*) • flower weevil (*Larinus curtus*) • yellow starthistle hairy weevil, (*Eustenopus villosus*) • flies (*Urophora sirunaseva and U. jaculata*) (All of the above are approved.) • false peacock fly (*Chaetorellia succinea*) (Effective, but waiting for final approval.)	• glyphosate • picloram • *clopyralid* • 2,4-D amine + • clopyralid	Revegetation with native species for shade.	Mowing, burning early in flower (timing is critical). Grazing before spine production (toxic to horses). (Hard to control seed ban with mechanical methods.)
Poison hemlock	*Conium maculatum*	Biennial, winter annual, or rarely perennial	Seeds.	• defoliating moth (Agonopterix alstroemeriana)	• glyphosate • 2,4-D • hexazinone • metribuzin • tebuthiuron	Establish and maintain healthy native vegetation.	Frequent low mowing or cutting (no grazing, poisonous to livestock). Hand-pulling (gloves) or cultivating works well, continue as long as viable seed remains in seed bank.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Field bindweed	*Convolvulus arvensis*	Perennial	Seeds (viable up to 50 years) and creeping deep roots.	• leaf-galling mites (*Aceria malherbae / A. convolvuli*)	• glyphosate • 2,4-D + dicamba • picloram • metsulfuron	Establish and maintain healthy native vegetation, especially perennial grasses.	Hand-pulling (and cultivating) must be done for 3 to 5 years every 2 weeks to be effective. Neither grazing nor mowing are effective controls.
Common crupina	*Crupina vulgaris*	Winter annual	Seeds (viable 3 years or less).	None known.	• glyphosate • 2,4-D + dicamba	Establish and maintain healthy native vegetation (must revegetate after removal).	Preventing all seed production for at least two generations (hand-pulling, plowing, and hoeing).
Scotch broom	*Cytisus scoparius*	Woody perennial	Seed, some sprouting (seeds remain viable in soil for up to 80 years).	None have proven effective in Idaho.	• 2,4-D • triclopyr ester • picloram + 2,4-D	Revegetation for shade.	Hand-pulling (must be repeated for many years due to long dormancy of seed in soil). Grazing with goats (or chickens).
Toothed spurge	*Euphorbia dentata*	Annual	Seeds.	None currently available.	• glyphosate	Reduce disturbance. Change grazing regime to allow native species to thrive.	Hand-pulling or grubbing is effective.
Meadow hawkweed	*Hieracium pratense*	Perennial	Seeds (wind-adapted), stolons, and rhizomes.	None currently available.	• glyphosate • 2,4-D + picloram • clopyralid • dicamba + 2,4-D [Spray in spring before bloom.]	Revegetation for shade by seeding and fertilization. Annual cultivation.	Hand-pulling not recommended (stimulates sprouting from rhizomes) must remove all roots.

APPENDIX C
Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Orange hawkweed	*Hieraclum aurantiacum*	Perennial	Seeds (wind-adapted), stolons, and rhizomes.	None currently available.	• 2,4-D + picloram • glyphosate • clopyralid • dicamba + 2,4-D • Spray in spring before bloom.	Revegetation for shade by seeding and fertilization. Annual cultivation.	Hand-pulling not recommended (stimulates sprouting from rhizomes) difficult to remove all roots.
Perennial pepperweed	*Lepidium latifolium*	Perennial	Seeds and creeping roots.	None approved.	• chlorsulfuron • imazapyr [Should be applied at flower-bud stage.]	Establish and maintain healthy riparian vegetation.	Fall-disking, spring mowing, followed by herbicides, including glysophatės has some good results.
Purple loosestrife	*Lythrum salicaria*	Perennial	Seeds and rhizomes.	• weevil (*Hylobius transversovittatus*) • black-margined and golden leaf eating beetles (*Galerucella calmariensis* and *G. pusilla*) • flower weevil (*Nanophyes marmoratus*)	• glyphosate (When plants begin to flower.) [Rodeo™ has approval for wetlands.] [3]	Revegetation can be effective.	Hand-pulling or cutting before flowering, followed immediately by flooding (general mowing or cutting not recommended).
Milium	*Milium vernale*	Winter annual	Seeds.	None currently available.	• glyphosate • chlorsulfuron	Revegetation is effective.	Spring plowing.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Eurasian watermilfoil	*Myriophyllum spicatum*	Perennial	Produces seeds (rarely), but prolifically spread by runners and autofragments.	• native midge (*Cricotopus myriophylli*) • weevil (*Euhrychiopsis lecontei*) • caddisfly (*Triaenodes tarda*)	(Plant die-off from spraying has caused fish die-off because of oxygen depletion in water.)		Water draw-downs in reservoirs prior to freezing temperatures can expose the plant and kill it. Cover small patches with opaque fabric, such as burlap.
Matgrass	*Nardus stricta*	Perennial	Seeds.	None known.	• glyphosate		
Silverleaf nightshade	*Solanum elaeagnifolium*	Perennial	Seeds and spreading rhizomes.	None known.	• glyphosate picloram • imazapyr	Establish dense canopy-forming vegetation.	Cultivation must be frequent and thorough or will spread. Cutting and mowing ineffective.
Buffalo bur	*Solanum rostratum*	Annual	Seeds.	None known.	• glyphosate	Establish and maintain healthy native vegetation, particularly important to limit heavy grazing.	Avoid methods that disturb the soil.
Perennial sowthistle	*Sonchus arvensis*	Perennial	Seeds (2-5 year viability), and spreading, thickened horizontal roots (rhizomes).	• cyst-forming nematode (*Heterodera sonchophila*) • seedhead fly (*Tephritis dilacerata dilacerata*) (Waiting for final approval.)	• glyphosate • clopyralid • dicamba • 2,4-D • amitrol (Herbicides not very effective for this species.)	Establish and maintain healthy native vegetation.	Cutting, grazing, and mowing can be effective at depleting root stores, if done selectively and frequently. Hoeing and cultivating can be effective if done at 6-leaf rosette stage.

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)
Johnsongrass	*Sorghum halepense*	Perennial	Seeds and rhizomes.	None known.	• glyphosate (Must be used together with mechanical to be effective.)	Establish and maintain native vegetation.	Repeated mowing or grazing to reduce rhizome vigor followed by herbicide. Repeated and continuous tillage (do not till at all if cannot repeat continuously).
Puncturevine	*Tribulus terrestris*	Annual	Seeds (viable in soil 4-5 years).	• weevils (*Microlarinus lareynii* and *M. lypriformis*)	• glyphosate • picloram	Establish and maintain native vegetation.	Repeated cultivation. Neither mowing or grazing is effective.
Syrian bean caper	*Zygophyllum fabago*	Perennial	Seeds and lateral roots and root pieces.	None known.	Leaf surfaces are smooth and waxy, making herbicide control difficult.		Hand-pulling of entire root system.

APPENDIX C

Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest

Common Name	Scientific Name	Life Cycle	Modes Of Reproduction	Biocontrol Agents	Herbicide	Cultural (Restoration) Methods	Mechanical Methods (Includes Grazing)

[1]Approved for release 4/4/97; USFWS concurrence pending.

[2]Approved for release 6/17/98; USFWS concurrence pending.

[3] Spot application of Rodeo™ directly onto *L. salicaria* would ensure that no large holes would appear in the marsh vegetation and that competition would be unaffected. The safest method of applying glyphosate herbicide is to cut off all stems at about 6 inches and then paint or drip onto the cut surface a 20-30% solution (Henderson 1987).

[Int]Must use integrated weed management approach to successfully eradicate this species.

Sources of information used on this table include:

Henderson, R. 1987. Status and control of purple loosestrife in Wisconsin. Research management findings, Number 4, Bureau of Research, Wisconsin DNR, Madison.

Idaho Dept. of Agriculture. 2002a. Quick reference table. http://www.agri.state.id.us/PDF/Animal/NW%20Quick%20Ref.pdf

Morishita D.W. and L.W. Lass. (no date). Idaho's noxious weeds. Univ. of Idaho (Noxious Weed Advisory Council and ID Dept. of AG), Moscow, ID. 74 p.

PNW Weed Control Handbook. 2002. http://weeds.ippc.orst.edu/pnw/weeds

Sheley, R.L. and J.K. Petroff, eds. 1999. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, OR. 438 p.

The Nature Conservancy (various authors). 2002. Invasives on the web: element stewardship abstracts http://tncweeds.ucdavis.edu/index.html 1815 North Lynn Street, Arlington, VA

Whitson, T.D., L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, and R. Parker. 1999. Weeds of the west. Pioneer of Jackson Hole, Jackson, WY. 630 p.

Appendix D

Procedures for Mixing, Loading, and Disposal of Herbicides and Herbicide Spill Plan for Noxious Weed Control Salmon–Challis National Forest

APPENDIX D

Procedures for Mixing, Loading, and Disposal of Herbicides

Procedures for mixing, loading, and disposing of herbicides will comply with Forest Service Manual (FSM) 2109.14 Chapter 40.

The following summary is taken from the Frank Church River of No Return Noxious Weed Treatments Final Environmental Impact Statement, Intermountain and Northern Regions: Bitterroot, Nez Perce, Payette, and Salmon-Challis National Forests (U.S. Forest Service. 1999a).

- All mixing of herbicides will occur at least 100 feet from surface waters or well heads
- All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning
- Applicators will mix only those quantities of herbicides that can be reasonably used in a day
- During mixing, mixers will wear a hard hat, goggles or face shield, rubber gloves, rubber boots, and protective overalls
- All empty containers will be triple rinsed and disposed of by spraying near the treatment site at rates that do not exceed those on the treatment site
- All unused herbicides will be stored in a locked building in accordance with herbicide storage regulations contained in FSM 2109.14
- All empty and rinsed herbicide containers will be punctured and either burned or disposed of in a sanitary landfill
- Any additional herbicide label requirements will be strictly followed during the mixing, loading, and disposal of herbicides

Herbicide Spill Plan for Noxious Weed Control Salmon-Challis National Forest

All actions involving incidents, spills, and accidents will comply with FSM 2109.14 Chapter 60.

The following has been modified from the Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment (U.S. Forest Service 2000a).

A reportable herbicide spill is one pint of concentrate of herbicide and/or five gallons of mixed herbicide, even if these amounts can be contained and recovered by the weed field crew. Spills that can be contained and recovered will thereafter be applied in the field according to the label requirements for the herbicide. For any spill that cannot be contained or recovered by the weed field crew, spill clean-up will be assisted by one of the agencies listed below.

If a herbicide spill occurs, the field crew will radio the Ranger District they are working in, and report the spill. The receptionist on duty will use the form on the attached sheet to gather information. The information will then be forwarded to the appropriate District Safety Officer and to the S-CNF/BLM Interagency Hazardous Materials coordinator for appropriate action. The National Poison Control Center (1-800-222-1222) will be contacted as necessary.

At a minimum, the following equipment and materials will be available with vehicles or pack stock used to transport herbicides.

- A shovel
- Absorbent material or the equivalent
- Plastic garbage bags or buckets
- Rubber gloves
- Safety goggles
- Protective clothing
- Rubber boots
- Applicable Material Safety Data Sheets (MSDS)

For Supplemental Information Needed on Hazards and Reactions

Call Chemtrek at 1-800-424-9300. They are an information contact only; do not call them merely to report a spill. (Example: if a truck carrying herbicides crashes and ignites, field crews may want to know if any special hazards exist from herbicide fumes—Chemtrek is the appropriate company to call.)

IF THE SPRAYING CREW CALLS IN A HERBICIDE SPILL, COMPLETE THE FORM ON THE NEXT 2 PAGES.

Complete This Form
If the Herbicide Spraying Crew Calls in a Spill

Describe Injuries:

Number of People Contaminated: Whom they work for:

Name of Herbicide Released:

Date of Spill/Contamination:

Time of Herbicide Release:

Time Release Reported:

Location (State, County, Specific Location):

Estimate of Quantity Released (in gallons):

Name of Affected Water Course(s):

Rate of Mix of Chemical Released:

What Equipment was Involved in Release:

Employee Taking Call and Recording this Information:

Appendix E

Aerial Spray Recommendations and Spray Dispersion Model Predictions

APPENDIX E

Aerial Spray Recommendations and Spray Dispersion Model Predictions

The following is taken from Appendix F of the Lolo National Forest Big Game Winter Range and Burned Area Weed Management Final EIS (2001c). These aerial spray recommendations and dispersion models were developed for the Lolo National Forest in western Montana and are appropriate as examples for possible application on the Salmon-Challis National Forest.

Aerial Spray Recommendations

The treatment block should be marked with flagging to mark the block corners or clearly described and reviewed with applicator. It would be desirable to have a GPS system on board to record helicopter swaths, position, and boom on and off times and location.

In canyon areas, winds should follow the typical diurnal pattern of upslope during the day and down slope during the night. Canyon winds are those that move up or down the canyon; slope winds are those that move up or down the slope. These diurnal winds result from heating and cooling of the surface. Clear skies with solar radiation reaching the surface during the day cause up canyon and upslope winds. Cooling that occurs after sunset generates upslope or drainage winds. Given that waterways/riparian areas are often located in the bottom of canyon areas, it is essential to avoid drift down canyon and downslope. Down canyon and downslope winds will likely occur on clear days following daytime hours. To prevent spray from drifting down canyon/downslope, winds should be up canyon and upslope. This can be attained by taking the following steps:

- Spray in the morning when up canyon and upslope winds are well established and blowing up canyon. The specific time will need to be determined by real-time weather monitoring.
- Maintain a low boom pressure.
- Monitor spray pressure during flight, since changes in pressure can change the application rates and may change the drop size.
- Check nozzles and review calibration with pilot.
- Begin the first swath 300 feet from any sensitive area.
- Mark boundaries so they are clearly understood by the pilot.
- Treatment boundaries next to sensitive areas may be monitored with spray deposit cards to detect any possible drift.

- Monitor and record weather in the area. The weather should be monitored in real time for operational control and to help with the post-spray analysis.

FSCBG Spray Dispersion Model Predictions

FSCBG model predictions were conducted by Pat Skyler, FPM Pesticide Application Group, Davis, CA to assist in developing aerial spray strategies for proposed herbicide applications to control noxious weeds on the Lolo National Forest. The predictions can be used to do the following:

- Plan operational methodologies.
- Determine size of buffer strips to prevent or minimize sensitive area contamination
- Decide under which wind and other atmospheric conditions to conduct aerial spraying

Three commonly used aircrafts in Western Montana are the: Bell 47 Soloy, Bell 206BIII, and Hiller 12E. Table E-1, 2, and 3 lists the FSCBG model inputs.

TABLE E-1
Spray Conditions—FSCBG Model Inputs for Hiller 12E

Release Height	10 and 25 Feet Above Ground
Operating Speed	40 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	40 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-8.70 feet
Nozzle Type and Orientation	CP/0 degrees
Number of Nozzles	29
Rotor Diameter	35.43 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

TABLE E-2
Spray Conditions—FSCBG Model Inputs for Bell 206BIII

Release Height	10 and 25 Feet Above Ground
Operating Speed	80 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	45 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-9.01 feet
Nozzle Type and Orientation	TeeJet D4-46/0 degrees
Number of Nozzles	35
Rotor Diameter	33.37 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

TABLE E-3
Spray Conditions—FSCBG Model Inputs for Bell 47 Soloy

Release Height	10 and 25 Feet Above Ground
Operating Speed	50 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	45 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-8.07 feet
Nozzle Type and Orientation	D8 Jet/45 degrees
Number of Nozzles	16
Rotor Diameter	37.17 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

The entire modeling report is one file at the Lolo National Forest. The three FSCBG models ran different inputs for operating (flight) speed, nozzle type, orientation, and number, and swath and rotor widths. Under these three scenarios, the models demonstrate that 1) the direction of off-target deposition can be managed by monitoring the winds and conducting spray operations under conditions that will carry the spray away from the buffer area and onto the spray block; and 2) even when spraying under a 6-mph crosswind of 45 and 85 degrees, there is essentially no deposition within a 300-foot-wide buffer zone.

The entire modeling report is on file at the Lolo NF. Modeling runs clearly demonstrate that:

- Most of the spray is deposited in the treatment block regardless of wind direction
- Direction of off-target deposition can be managed by monitoring the winds and conducting spray operations under conditions that will carry the spray away from the sensitive areas and into the spray block.
- Even when spraying under a crosswind and directions of 45 and 85 degrees, there would be essentially no deposition in the sensitive areas with a buffer of 300 feet.
- However, there would be no applications in these crosswind situations.

Appendix F

Herbicide Leaching Sensitivity Evaluation for Upland Sites

APPENDIX F

Herbicide Leaching Sensitivity Evaluation for Upland Sites

This rating system is based on a system established for the Noxious Weed Management Projects FEIS on the Spotted Bear (MT) Ranger District in 1993. It has since been modified to reflect conditions found across the Flathead (MT) National Forest, and further modified to reflect characteristics of the Salmon-Challis National Forest.

Herbicide Sensitivity Evaluation for Upland Sites (Rating Ground Water Vulnerability to Contamination)

This evaluation is for use on **UPLAND SITES ONLY**. Riparian areas would receive special treatment as outlined in the Decision Tree of the EA for the Noxious and Invasive Weed Control project.

To use this evaluation system, evaluate the local site characteristics and sum the rating numbers, as follows:

High risk of leaching is associated with numbers that range from 40 to 30.

Moderate risk ranges from 29 to 20.

Low risk ranges from 19 to 5.

As the risk of leaching increases, the herbicide used on the site must have a lower leaching index.

Depth to Ground Water:

<15 FT = 10
15-50 FT = 5
> 50 FT = 0

Precipitation Zone:

30+ inches = 10
15-30 inches = 7
< 15 inches = 2

Soil Texture:

Gravelly = 10
Sandy = 8
Loamy = 5
Clayey = 2

Organic Matter:

Bare Ground = 10
Sagebrush/Grass = 8
Ponderosa pine = 7
Lodgepole pine/Douglas fir = 5
Meadow (sodgrass/sedge) = 3
Spruce/Alpine fir = 2
Grass = 2

The total score indicates the risk that pesticides would leach and reach ground water, given the site characteristics evaluated.

APPLICATION

Herbicides with the lower leaching indices, such as 2,4-D and Glyphosate, should be used on sites with characteristics leading to a high risk of leaching.

The risk of leaching is greatest for Picloram, followed in decreasing order by Clopyralid, Dicamba, 2,4-D, and Glyphosate.

The information used to develop the above criteria was drawn from the following sources:

- Bovey and others (1975), who attributed low concentrations of herbicide in the soil after spraying to the grass on the site;
- Wolt (1997) who modeled a pesticide leaching assessment for the Tansy Ragwort EIS on the Tally Lake Ranger District;
- The Montana Department of Agriculture (1997) cited in the EPA's comments on the Tansy EIS in reference to adequate soil depth to prevent leaching of Clopyralid into ground water;
- Herr and others (1966) and Moffat and others (1966), both cited in Baur and others (1972) in reference to the relative leaching rate in sandy vs clayey soils.

The actual risk that a pesticide would leach into ground water is also governed by the characteristics of the pesticide itself. For example, each herbicide has a different half life in the soil. Those with a longer half life have more time to leach to a greater depth. Most herbicides do not attach to soil particles, a few do and this characteristic influences the movement of herbicides through the soil.

Water solubility also affects the rate at which herbicides move through the soil. Those that are more soluble in water move to a greater extent.

RATIONALE

Depth to ground water is difficult to estimate in most places. However, there are sites where terraces lie a few feet above a river. Some of these terraces lack riparian characteristics; they are dry because of coarse, well-drained soils that make them highly susceptible to leaching. If the terrace surface is within 15 feet of the water table, there is a risk that herbicides could be leached into the water table. Only herbicides with a low risk of leaching should be used in these areas.

Precipitation leaches pesticides. The higher the precipitation zone, the greater the potential for leaching.

Soil texture influences the leaching of pesticides. Coarse soils are more susceptible to leaching than are fine textured soils. Fine textured soil particles are able to bond with some chemicals, which keeps the chemicals in the soil.

Organic matter holds onto pesticides and prevents them from leaching. The ability of organic matter to hold pesticides is greater than that of soil. The higher the organic content of the soil and the thicker the humus layer on the soil surface, the less risk there is of leaching. Soils with grass have high amounts of organic matter in the soil surface. Dry forest types have the least amount of organic matter in the soil.

Appendix G

U.S. Fish and Wildlife Service Consultation Letters and Additional Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Basin Office, Columbia River Basin Ecoregion
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

JAN 2 5 2...

Charles L. Blair
CH2M Hill
700 Clearwater Lane
Boise, Idaho 83712

Subject: Forest-wide Noxious Weed Management Program -- Salmon-Challis National Forest, Idaho -- Species List
File #114.0000 1-4-02-SP-355

Dear ~~Mr. Blair~~ Chuck:

The U. S. Fish and Wildlife Service (Service) is providing you with a list of endangered, threatened, proposed, and/or candidate species which may be present in the area of the proposed forest-wide noxious weed management program, Salmon-Challis National Forest, Idaho. You requested this list in a letter dated January 8, 2002, received by this office on January 8, 2002. The list fulfills requirements for a species list under Section 7(c) of the Endangered Species Act of 1973 (Act), as amended. If the project decision has not been made within 180 days of this letter, regulations require that you request an updated list. Please refer to the number shown on the list (Enclosure) in all correspondence and reports.

Section 7 of the Act requires Federal agencies to assure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Federal funding, permitting, or land use management decisions are considered to be Federal actions subject to Section 7. If the proposed action may affect a listed species, consultation with the Service is required. Formal consultation must be initiated for any project that is likely to adversely affect a threatened or endangered species. If a project involves a major construction activity and may affect listed species, Federal agencies are required to prepare a Biological Assessment. If a proposed species is likely to be jeopardized by a Federal action, regulations require a conference between the Federal agency and the Service. A Federal agency may designate, in writing, you or another non-Federal entity to represent them in consultation.

If you need any further information, please contact Carol Evans of our office in Chubbuck at (208) 237-6975. Thank you for your continued interest in endangered species conservation.

Sincerely,

for Supervisor, Snake River Basin Office

Enclosure

cc: FWS-ES, Chubbuck (Evans)

ENCLOSURE

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE FOREST-WIDE NOXIOUS WEED MANAGEMENT PROGRAM, SALMON-CHALLIS NATIONAL FOREST, IDAHO
SP #1-4-02-SP-355

LISTED SPECIES	COMMENTS
Grizzly bear (LT) *(Ursus arctos)*	Management area; potential linkage corridors
Canada lynx (LT) *(Lynx canadensis)*	
Gray wolf (XN) *(Canis lupus)*	Experimental/Non-essential population
Sockeye salmon (LE) *(Oncorhynchus nerka)*	Under National Marine Fisheries Service jurisdiction
Chinook salmon (LT) *(Oncorhynchus tshawytscha)*	Under National Marine Fisheries Service jurisdiction
Steelhead (LT) *(Oncorhynchus mykiss)*	Under National Marine Fisheries Service jurisdiction
Bull trout (LT) *(Salvelinus confluentus)*	
Bald eagle (LT) *(Haliaeetus leucocephalus)*	Wintering area/nesting area
Ute ladies'- tresses (LT) *(Spiranthes diluvialis)*	

PROPOSED SPECIES

None

CANDIDATE SPECIES

Yellow-billed cuckoo (C)
(Coccyzus americanus)

GENERAL COMMENTS

LE - Listed endangered
LT - Listed threatened
XN- Experimental/Non-essential population
PT - Proposed threatened
C - Candidate

GRAY WOLF (*Canis lupus*) is listed as endangered in the coterminous United States, except where it is listed (1) as threatened (Minnesota) or (2) as a nonessential experimental population including Wyoming, and portions of Idaho and Montana. Within the central Idaho area, the nonessential experimental population areas are those portions of Idaho that are south of Interstate Highway 90 and west of Interstate Highway 15, and those portions of Montana south of Interstate Highway 90, Highway 93 and 12 from Missoula, Montana west of Interstate Highway 15. Portions of the Yellowstone Management Area (YMA) in Idaho and Montana are designated as the nonessential experimental population area. The boundaries of the YMA include that portion of Idaho that is east of Interstate Highway 15; that portion of Montana that is east of Interstate Highway 15 and south of the Missouri River from Great Falls, Montana, to the eastern Montana border; and all of Wyoming.

Federal action agencies are required to confer with the Service if their actions are likely to jeopardize the continued existence of gray wolves; or you have the option of conferring with the Service regardless of the determination.

UTE LADIES'-TRESSES (*Spiranthes diluvialis*) has the potential to occur in wetland and riparian areas including springs, wet meadows, and river meanders. The plant is known to occur at sites ranging from 1, 500 to 7,000 feet in elevation. This species generally flowers from mid-July through September, and can be identified definitively only at that time. The orchid can remain dormant for several years; therefore, we suggest surveys for the orchid be scheduled for sequential years. The species may be adversely affected by modification of riparian and wetland habitats associated with livestock grazing, vegetation removal, excavation, construction for residential or commercial purposes, stream channelization, hydroelectric development and operation, and actions that alter hydrology.

CANDIDATE SPECIES that appear on the Enclosure have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

YELLOW-BILLED CUCKOO *(Coccyzus americanus)* is a candidate species. On July 24, 2001 the U.S. Fish and Wildlife Service published its finding that the yellow-billed cuckoo warrants protection under the Endangered Species Act but is precluded from listing by other priorities. Yellow-billed cuckoos in the West are overwhelmingly associated with relatively expansive stands of mature cottonwood-willow forests. They appear to be dependent on the combination of a dense willow understory for nesting, a cottonwood overstory for foraging and large patches of habitat in excess of 20 ha. The species will occupy a variety of marginal habitats, particularly at the edges of their range, but is not known to use non-native vegetation in the majority of its range. The species should be considered when actions involve habitat that is now, or was historically, suitable for yellow-billed cuckoos.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Basin Office
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

SEP 03 2002

Salmon — Challis National Forest
SEP - 9 2002
RECEIVED

George Matejko
Forest Supervisor
Salmon-Challis National Forest
Rural Route #2
P.O. Box 600
Salmon, Idaho 83467-9812

Subject: 90-Day Species List Update
File #114.0000, 112.0000 1-4-02-SP-908

Dear Mr. Matejko:

The U.S. Fish and Wildlife Service (Service) is writing to provide you with an updated list of endangered, threatened, proposed, and candidate species which may occur on the Salmon-Challis National Forest. We have enclosed the current lists. Please note that the lists are now presented by Ranger District and may have content changes. This letter officially updates species list number 1-4-02-SP-691 of June 24, 2002, and provides you with a new number 1-4-02-SP-908. You should refer to the new number in subsequent correspondence and documentation.

The Service has developed biological information and guidance for all of the endangered, threatened, proposed, and candidate species that occur within the jurisdiction of the Snake River Basin Office, and are including them with this letter. These guidelines were designed to assist Federal agencies in evaluating project effects on listed species. Please use this guidance when making effects determinations and preparing Biological Assessments.

Information concerning Federal agency obligations under the Endangered Species Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Kendra Womack of my staff at (208) 685-6955. If you have questions regarding species under the National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction, please call (208) 756-6472. Carol Evans of my Eastern Idaho sub-office continues to be your primary contact regarding Section 7 issues. She can be reached at (208) 237-6975.

Thank you for your continued interest in endangered species conservation.

Sincerely,

for Supervisor, Snake River Basin Office

cc: FWS-ES, Chubbuck (Evans)
USFS-Region 4, Ogden
Cobalt Ranger District (Hershey)
North Fork Ranger District (Bates)
Leadore Ranger District (Ward)
Salmon Ranger District (Hershey)
Middle Fork Ranger District (Bates)
Challis and Yankee Fork Ranger District (Mabe)
Lost River Ranger District (Eckert)
NMFS, Boise (Brege)
Wildlife Services, Boise (Collinge)

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
CHALLIS RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LEADORE RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LOST RIVER RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
MIDDLE FORK RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Fall chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
NORTH FORK RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Fall chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
SALMON/COBALT RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)* C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
YANKEE FORK RANGER DISTRICT
SPECIES LIST #1-4-02-SP-908

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

The Fish and Wildlife Service is interested in the following plants and/or animals that may occur within the area of the Salmon-Challis National Forest, and are providing this list for your information. We are concerned about their population status and threats to their long-term viability. These species have no legal status under the Endangered Species Act, therefore you are not obliged to account for them. However, in context with ecosystem-level management, we suggest that you consider these species and their habitats in project planning and review.

Mammals

Wolverine
(Gulo gulo)

Pygmy rabbit
(Brachylagus idahoensis)

Townsend's big-eared bat
(Corynorhinus townsendii)

Spotted bat
(Euderma maculatum)

Fringed myotis
(Myotis thysanodes)

Fisher
(Martes pennanti)

Kit fox
(Vulpes macrotis)

Fish

Westslope cutthroat trout
(Oncorhynchus clarki lewisi)

Wood River sculpin
(Cottus leiopomus)

White sturgeon
(Acipenser transmontanus)

Birds

Greater sage-grouse
(Centrocercus urophasianus)

Birds, continued

Columbian sharp-tailed grouse
(Tympanuchus phasianellus)

Northern goshawk
(Accipiter gentilis)

Black tern
(Chlidonias niger)

Harlequin duck
(Histrionicus histrionicus)

Loggerhead shrike
(Lanius ludovicianus)

Trumpeter swan
(Cygnus buccinator)

Three-toed woodpecker
(Picoides tridactylus)

Black-backed woodpecker
(Picoides arcticus)

Boreal owl
(Aegolius funereus)

Great gray owl
(Strix nebulosa)

Flammulated owl
(Otus flammeolus)

Birds, continued
Northern pygmy owl
(Glaucidium gnoma)

Pygmy nuthatch
(Sitta pygmaea)

Amphibians and Reptiles
Western toad / BOREAL TOAD
(Bufo boreas)

Northern leopard frog
(Rana pipiens)

Columbia spotted frog-Northern population
(Rana luteiventris)

Invertebrates
Idaho pointheaded grasshopper
(Acrophitus punchellus)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Basin Office
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

Salmon — Challis National Forest

24

OCT 18 2002

George Matejko
Forest Supervisor
Salmon-Challis National Forest
Rural Route #2
P.O. Box 600
Salmon, Idaho 83467-9812

Subject: 90-Day Species List Update-Revised Version
File #114.0000, 112.0000 1-4-03-SP-030

George

Dear Mr. Matejko:

The U.S. Fish and Wildlife Service (Service) provided you with an updated list of endangered, threatened, proposed, and candidate species which may occur on the Salmon-Challis National Forest on September 3, 2002. After discussions with your staff, we have revised the previous version of this list. We have removed fall chinook salmon from the North Fork and Middle Fork Ranger District lists and have removed all anadromous fish species from the Lost River Ranger District list. This letter officially updates species list number 1-4-02-SP-908 of September 3, 2002, and provides you with a new number 1-4-03-SP-030. You should refer to the new number in subsequent correspondence and documentation.

Information concerning Federal agency obligations under the Endangered Species Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Kendra Womack of my staff at (208) 685-6955. If you have questions regarding species under the National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction, please call (208) 756-6472. Carol Evans of my Eastern Idaho sub-office continues to be your primary contact regarding Section 7 issues. She can be reached at (208) 237-6975.

Thank you for your continued interest in endangered species conservation.

Sincerely,

for Supervisor, Snake River Basin Office

cc: FWS-ES, Chubbuck (Evans)
USFS-Region 4, Ogden
Cobalt Ranger District (Hershey)
North Fork Ranger District (Bates)
Leadore Ranger District (Ward)
Salmon Ranger District (Hershey)
Middle Fork Ranger District (Bates)
Challis and Yankee Fork Ranger District (Mabe)
Lost River Ranger District (Eckert)
NMFS, Boise (Brege)
Wildlife Services, Boise (Collinge)

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
CHALLIS RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LEADORE RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LOST RIVER RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1] Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
MIDDLE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
NORTH FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
SALMON/COBALT RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
YANKEE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-030

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES

None

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

The Fish and Wildlife Service is interested in the following plants and/or animals that may occur within the area of the Salmon-Challis National Forest, and are providing this list for your information. We are concerned about their population status and threats to their long-term viability. These species have no legal status under the Endangered Species Act, therefore you are not obliged to account for them. However, in context with ecosystem-level management, we suggest that you consider these species and their habitats in project planning and review.

<u>Mammals</u>
Wolverine
(Gulo gulo)

Pygmy rabbit
(Brachylagus idahoensis)

Townsend's big-eared bat
(Corynorhinus townsendii)

Spotted bat
(Euderma maculatum)

Fringed myotis
(Myotis thysanodes)

Fisher
(Martes pennanti)

Kit fox
(Vulpes macrotis)

<u>Fish</u>
Westslope cutthroat trout
(Oncorhynchus clarki lewisi)

Wood River sculpin
(Cottus leiopomus)

White sturgeon
(Acipenser transmontanus)

<u>Birds</u>
Greater sage-grouse
(Centrocercus urophasianus)

<u>Birds, continued</u>
Columbian sharp-tailed grouse
(Tympanuchus phasianellus)

Northern goshawk
(Accipiter gentilis)

Black tern
(Chlidonias niger)

Harlequin duck
(Histrionicus histrionicus)

Loggerhead shrike
(Lanius ludovicianus)

Trumpeter swan
(Cygnus buccinator)

Three-toed woodpecker
(Picoides tridactylus)

Black-backed woodpecker
(Picoides arcticus)

Boreal owl
(Aegolius funereus)

Great gray owl
(Strix nebulosa)

Flammulated owl
(Otus flammeolus)

Birds, continued
Northern pygmy owl
(Glaucidium gnoma)

Pygmy nuthatch
(Sitta pygmaea)

Amphibians and Reptiles
Western toad
(Bufo boreas)

Northern leopard frog
(Rana pipiens)

Columbia spotted frog-Northern population
(Rana luteiventris)

Invertebrates
Idaho pointheaded grasshopper
(Acrophitus punchellus)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Fish and Wildlife Office
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

DEC 04 2002

George Matejko
Forest Supervisor
Salmon-Challis National Forest
Rural Route #2
P.O. Box 600
Salmon, Idaho 83467-9812

Subject: 90-Day Species List Update
File #114.0000, 112.0000 SP #1-4-03-SP-110

Dear Mr. Matejko: George

The U.S. Fish and Wildlife Service (Service) is writing to provide you with an updated list of endangered, threatened, proposed, and candidate species which may occur on the Salmon-Challis National Forest. We have enclosed the current lists. This letter officially updates species list number 1-4-02-SP-908 of September 3, 2002, and provides you with a new number 1-4-03-SP-110. You should refer to the new number in subsequent correspondence and documentation. In addition to content changes for individual Ranger District lists, please note the following amendment.

On November 29, 2002, pursuant to Section 4(a)(3) of the Endangered Species Act (Act), the Service proposed critical habitat designations for the Columbia River Basin and Klamath River Basin distinct population segments of bull trout *(Salvelinus confluentus)*. This proposed designation includes approximately 8,958 miles of streams and 205,639 acres of lakes and reservoirs in the State of Idaho, some of which may occur within your jurisdiction. Section 7(a)(4) of the Act requires that Federal agencies confer with the Service on any Federal action that is likely to result in the destruction or adverse modification of proposed critical habitat. If you need more information regarding proposed critical habitat designations, please visit the Service's Region 1 bull trout information website at http://pacific.fws.gov/bulltrout.

This officially updates species list 1-4-02-SP-908 and provides you with a new number 1-4-03-SP-110. You should refer to the new number in subsequent correspondence and documentation.

Information regarding Federal agency obligations under the Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions please call Kendra Womack at (208) 685-6955, or visit our website at http://idahoes.fws.gov for

more information. If you have questions regarding species under the National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction, please call (208) 756-6472. Carol Evans of my Eastern Idaho Field Office continues to be your primary contact regarding Section 7 issues. She can be reached at (208) 237-6975.

Thank you for your continued interest in endangered species conservation.

Sincerely,

Alison Beck Haas

for Supervisor, Snake River Fish and Wildlife Office

cc: FWS-ES, Chubbuck (Evans)
USFS-Region 4, Ogden
Cobalt Ranger District (Hershey)
North Fork Ranger District (Bates)
Leadore Ranger District (Ward)
Salmon Ranger District (Hershey)
Middle Fork Ranger District (Bates)
Challis and Yankee Fork Ranger District (Mabe)
Lost River Ranger District (Eckert)
NMFS, Boise (Brege)
Wildlife Services, Boise (Collinge)

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
CHALLIS RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LEADORE RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LOST RIVER RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
MIDDLE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
NORTH FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
SALMON/COBALT RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
YANKEE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-110

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

December 2002

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Fish and Wildlife Office
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

FEB 26 2003

George Matejko
Forest Supervisor
Salmon-Challis National Forest
Rural Route #2
P.O. Box 600
Salmon, Idaho 83467-9812

Subject: 90-Day Species List Update
File #114.0000, 112.0000 1-4-03-SP-279

George
Dear ~~Mr. Matejko~~:

The U.S. Fish and Wildlife Service (Service) is writing to provide you with an updated list of endangered, threatened, proposed, and candidate species, and proposed critical habitat which may occur on the Salmon-Challis National Forest. We have enclosed the current lists. Please note that the lists are now presented by Ranger District and may have content changes. This letter officially updates species list number 1-4-03-SP-110 of December 4, 2002, and provides you with a new number 1-4-03-SP-279. You should refer to the new number in subsequent correspondence and documentation.

Information concerning Federal agency obligations under the Endangered Species Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Kendra Womack of my staff at (208) 685-6955. If you have questions regarding species under the National Marine Fisheries Service (NOAA Fisheries) jurisdiction, please call (208) 756-6472. Carol Evans of our Eastern Idaho Field Office continues to be your primary contact regarding section 7 issues. She can be reached at (208) 237-6975.

Thank you for your continued interest in endangered species conservation.

Sincerely,

for Supervisor, Snake River Fish and Wildlife Office

cc: FWS-ES, Chubbuck (Evans)
USFS-Region 4, Ogden
Salmon and Cobalt Ranger Districts (Hershey)
North Fork Ranger District (Bates)
Leadore Ranger District (Ward)
Middle Fork Ranger District (Bates)
Challis Ranger District (Mabe)
Yankee Fork Ranger District (Mabe)
Lost River Ranger District (Eckert)
NOAA Fisheries, Boise (Brege)
Wildlife Services, Boise (Collinge)

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
CHALLIS RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT

Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]

Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LEADORE RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
LOST RIVER RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
MIDDLE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
NORTH FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
SALMON/COBALT RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1] Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

SALMON-CHALLIS NATIONAL FOREST
90 DAY SPECIES LIST UPDATE
YANKEE FORK RANGER DISTRICT
SPECIES LIST #1-4-03-SP-279

LISTED SPECIES	COMMENTS
Gray wolf *(Canis lupus)*	XN - Experimental/Non-essential population
Canada lynx *(Lynx canadensis)*	LT
Bald eagle *(Haliaeetus leucocephalus)*	LT
Bull trout *(Salvelinus confluentus)*	LT
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	LT - NOAA Fisheries jurisdiction
Steelhead trout *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction

PROPOSED SPECIES/CRITICAL HABITAT	
Bull trout *(Salvelinus confluentus)*	Proposed critical habitat

CANDIDATE SPECIES[1]	
Yellow-billed cuckoo *(Coccyzus americanus)*	C

[1]Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

March 2003

The Fish and Wildlife Service is interested in the following plants and/or animals that may occur within the area of the Salmon-Challis National Forest, and are providing this list for your information. We are concerned about their population status and threats to their long-term viability. These species have no legal status under the Endangered Species Act, therefore you are not obliged to account for them. However, in context with ecosystem-level management, we suggest that you consider these species and their habitats in project planning and review.

Mammals

- Wolverine *(Gulo gulo)*
- Pygmy rabbit *(Brachylagus idahoensis)*
- Townsend's big-eared bat *(Corynorhinus townsendii)*
- Spotted bat *(Euderma maculatum)*

Birds

- Greater sage-grouse *(Centrocercus urophasianus)*
- Northern goshawk *(Accipiter gentilis)*
- Boreal owl *(Aegolius funereus)*
- Great gray owl *(Strix nebulosa)*
- Flammulated owl *(Otus flammeolus)*

Fish

- Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*
- White sturgeon *(Acipenser transmontanus)*

Reptiles and Amphibians

- Columbia spotted frog *(Rana luteiventris)*-Northern population

United States Department of the Interior

FISH AND WILDLIFE SERVICE

SNAKE RIVER FISH AND WILDLIFE OFFICE
1387 S VINNELL WAY, SUITE 368
BOISE, ID 83709
Telephone (208) 378-5243 Fax Number (208) 378-5262

MAY 3 0 2003

George Matejko
Forest Supervisor
Salmon-Challis National Forest
Rural Route #2
P.O. Box 600
Salmon, Idaho 83467-9812

Subject: 90-Day Species List Update
File #114.0000, 112.0000 1-4-03-SP-629

Dear ~~Mr. Matejko~~ George:

The U.S. Fish and Wildlife Service (Service) is writing to update species list 1-4-03-SP-279 of February 26, 2003 for the Salmon-Challis National Forest. There are no changes or additions to the previous list.

This officially updates species list 1-4-03-SP-279 and provides you with a new number 1-4-03-SP-629. You should refer to the new number in subsequent correspondence and documentation.

Information concerning Federal agency obligations under the Endangered Species Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Kendra Womack of my staff at (208) 685-6955. If you have questions regarding species under the National Marine Fisheries Service (NOAA Fisheries) jurisdiction, please call (208) 756-6472. Carol Evans of our Eastern Idaho Field Office continues to be your primary contact regarding section 7 issues. She can be reached at (208) 237-6975.

Thank you for your continued interest in endangered species conservation.

Sincerely,

Alison Beck Haas

for Jeffery L. Foss, Supervisor,
Snake River Fish and Wildlife Office

RECEIVED

JUN 0 3 2003

cc: FWS-ES, Chubbuck (Evans)
USFS-Region 4, Ogden
Salmon and Cobalt Ranger Districts (Hershey)
North Fork Ranger District (Bates)
Leadore Ranger District (Hilliard)
Middle Fork Ranger District (Montoya)
Challis Ranger District (Rau)
Yankee Fork Ranger District (Montoya)
Lost River Ranger District (Eckert)
NOAA Fisheries, Boise (Brege)
Wildlife Services, Boise (Collinge)

Appendix G

Additional Consultation with the U.S. Fish and Wildlife Service

U. S. Fish and Wildlife Service (USFWS) biologists were contacted and the USFWS Website (Idaho Endangered, Threatened, Proposed, and Candidate Species by County) was accessed on September 17 and 18, 2002, as part of continuing Section 7 consultation under the Endangered Species Act (ESA). ESA regulations require that an updated species list for the proposed project area be requested from the USFWS if a project decision has not been made within 180 days of when the USFWS first issued their species list. The current method for compiling a FWS species list is to access the USFWS Website and examine species' listings for each county within the project area. Review of USFWS species information for Custer, Lemhi, Butte, and Blaine Counties indicated that as of September 18, 2002, no additional endangered, threatened, proposed, and candidate species for the Salmon-Challis National Forest (S-CNF) project area had been added to the species list (1-4-02-SP-355) contained in the USFWS consultation letter on the proposed project dated January 25, 2002.

A third consultation letter from the USFWS dated October 18, 2002, contained the most recent species lists (1-4-03-SP-030) for each Ranger District of the S-CNF. No additional endangered, threatened, proposed, and candidate species for the S-CNF project area had been added to the species list contained in the USFWS consultation letter dated January 25, 2002. The October 18, 2002, consultation letter from the USFWS stated that on the S-CNF, the threatened Snake River chinook salmon is represented by spring/summer-run fish and not fall-run fish of this species.

The most recent consultation letters from the USFWS dated December 4, 2002 (1-4-03-SP-110), February 26, 2003 (1-4-03-SP-279), and May 30, 2003 (1-4-03-SP-629), contain the most recent species lists for each Ranger District of the S-CNF. No additional endangered, threatened, proposed, and candidate species for the S-CNF project area have been added to the species list contained in the USFWS consultation letter dated October 18, 2002, except for proposed critical habitat designations for bull trout in each of the S-CNF Ranger Districts.

Appendix H

Documented Occurrences of Sensitive Plants, Sensitive Wildlife, and Sensitive Fish by Ranger District and HUCs 4 and 5 on the Salmon-Challis National Forest

Documented Occurrences of Sensitive Plants, Sensitive Wildlife, and Sensitive Fish by Ranger District and HUCs 4 and 5 on the Salmon-Challis National Forest.[1]

	SENSITIVE PLANTS [2]	SENSITIVE WILDLIFE	SENSITIVE FISH [3]
CHALLIS RANGER DISTRICT			
HUC4: PAHSIMEROI			
HUC5: BIG CREEK	ASTAQU, CYMDOU (2) CYMIBA (2), DRAINC	LYNCAN	BT CT
HUC5: LOWER PAHSIMEROI		AMBMAC BUFBOB	BT CS CT SH
HUC5: MIDDLE PAHSIMEROI			BT CS CT SH
HUC5: UPPER PAHSIMEROI	CYMDOU (4), CYMIBA (6) ERIHUM (3), GENTEN (5) PARKOK, SALFAR (3) SAXADO		BT CT
HUC4: UPPER SALMON			
HUC5: CHALLIS CREEK	ASTAMB	LYNCAN PICTRI	BT CS CT
HUC5: GRANDVIEW	ASTAMB, ASTAQU OXYBES, THEREP (2)	BUFBOB	
HUC5: MORGAN CREEK			BT CS CT SH SS
LEADORE RANGER DISTRICT			
HUC4: LEMHI BASIN			
HUC5: EIGHTEEN MILE	ASTGIL, ASTLEP (2) CYMIBA, DRAINC PENLEM (3)	BUFBOB LYNCAN RANLUT	BT CT
HUC5: HAYDEN	AGOLAC, HACDAV PHALYA, PHYDIL	AMBMAC LYNCAN	BT CS CT
HUC5: LOWER LEMHI	PHALYA (3)	ACCGEN RANLUT	BT CS CT
HUC5: MIDDLE LEMHI	AGOLAC (3), CASPUL	ACCGEN AMBMAC HALLEU LYNCAN PICTRI RANLUT	BT CS CT
HUC5: TENDOY		ACCGEN LYNCAN STRNEB	BT CS CT
HUC5: TIMBER CREEK	AGOLAC	LYNCAN RANLUT STRNEB	BT CS CT

	SENSITIVE PLANTS [2]	SENSITIVE WILDLIFE	SENSITIVE FISH [3]
LOST RIVER RANGER DISTRICT			
HUC4: BIG LOST			
HUC5: EAST FORK BIG LOST RIVER	ASTLEP (3) ERICAW GENPRO RANPYG SAXCER CARSTR ERIHUM PARKOK SAXADO	GULGUL RANLUT	
HUC5: MACKAY	ASTAMN (6) SILSCL (2)	LYNCAN	
HUC5: NORTH FORK BIG LOST RIVER	ASTLEP (2) DRAFLA PARKOK RANPYG SAXCER CARINI ERIHUM RANGEL SAXADO		
HUC5: WILLOW CREEK	CYMDOU (3) ERICAW GENPRO OXYBES POAABM SAXCER (3) CYMIBA (5) ERIHUM GENTEN PARKOK SAXADO (3)	FALPEA	
HUC4: LITTLE LOST			
HUC5: LITTLE LOST SINKS	ASTAMN (2) HACDAV SILSCL ASTAQU LEWKEL		
HUC5: LOWER LITTLE LOST	ASTAMN (2) SAXCER (2) ERIHUM SILSCL (3)		
HUC5: MIDDLE LITTLE LOST	BOTMIN PAPRAK SAXCER SILURM ERIHUM (2) SAXADO SILSCL		BT
HUC5: UPPER LITTLE LOST	CYMDOU	LYNCAN	BT
NORTH FORK RANGER DISTRICT			
HUC4: MIDDLE SALMON-CHAMBERLAIN			
HUC5: CORN-KITCHEN	HACDAV PENLEM (2)	HALLEU	
HUC4: MIDDLE SALMON-PANTHER			
HUC5: COLSON-OWL	EPIGIG PENLEM (2) HACDAV (2)	ACCGEN LYNCAN GULGUL MARPEN HALLEU OTUFLA	BT CS CT SH SS
HUC5: DEADWATER	PENLEM (4)	ACCGEN LYNCAN BUFBOB OTUFLA HALLEU RANLUT	BT CS CT SH SS

	SENSITIVE PLANTS [2]	SENSITIVE WILDLIFE	SENSITIVE FISH [3]
NORTH FORK RANGER DISTRICT			
HUC5: INDIANOLA	PENLEM (2)	OTUFLA	BT CS CT SH SS
HUC5: NORTH FORK	CHRTET (4) COLDEC (8) LEWKEL PENLEM (11) PHALYA	ACCGEN AEGFUN BUFBOB FALPEA GULGUL LYNCAN MARPEN OTUFLA RANLUT	BT CS CT SH SS
HUC5: RED ROCK	COLDEC PHALYA	BUFBOB CORTOW FALPEA HALLEU LYNCAN MARPEN OTUFLA	BT CS CT SH
HUC5: SHOUP	ERISAL HACDAV (2) PENLEM (6)	AMBMAC BUFBOB HALLEU LYNCAN OTUFLA PICTRI RANLUT	BT CS CT SH SS
SALMON COBALT RANGER DISTRICT			
HUC4: LOWER MIDDLE FORK SALMON			
HUC5: LOWER CAMAS CREEK	HACDAV PENLEM (2)	CORTOW GULGUL LYNCAN RANLUT STRNEB	BT CS CT SH
HUC5: UPPER CAMAS CREEK			BT CS CT
HUC5: YELLOWJACKET		LYNCAN	BT CS CT SH
HUC4: MIDDLE SALMON-PANTHER			
HUC5: DEADWATER	PENLEM (2)	ACCGEN GULGUL LYNCAN STRNEB	BT CS CT SH SS
HUC5: DEEP-MOYER	PENLEM (5)	AEGFUN STRNEB	BT CT
HUC5: HAT CREEK			BT CS CT SH SS
HUC5: IRON CREEK		ACCGEN AEGFUN FALPEA LYNCAN OTUFLA	BT CS CT SH SS
HUC5: LOWER PANTHER CREEK	CORVIV EPIGIG HACDAV (2) PENLEM (10)	FALPEA GULGUL LYNCAN OTUFLA	BT CS CT SH SS
HUC5: MIDDLE PANTHER	CORVIV PENLEM (2)		BT CT SH
HUC5: NAPIAS	PENLEM (16)	ACCGEN AEGFUN GULGUL LYNCAN STRNEB	CT SH
HUC5: RED ROCK	PENLEM (2)		
HUC5: SALMON	PENLEM (12)	AEGFUN AMBMAC BUFBOB CORTOW GULGUL LYNCAN	BT CS CT SH SS
HUC5: TWELVE/LAKE	EPIGIG PENLEM (9)	LYNCAN OTUFLA	BT CS CT SH SS
HUC5: UPPER PANTHER	COLDEC PENLEM (4)	ACCGEN GULGUL LYNCAN OTUFLA STRNEB	BT CT

	SENSITIVE PLANTS [2]	SENSITIVE WILDLIFE	SENSITIVE FISH [3]
YANKEE FORK RANGER DISTRICT			
HUC4: UPPER MIDDLE FORK SALMON			
HUC5: MARSH CREEK	CARBUX CARLIV LEWKEL THLIDA (3)	ACCGEN GULGUL LYNCAN RANLUT STRNEB	BT CS CT SH
HUC4: UPPER SALMON			
HUC5: BAYHORSE		AMBMAC GULGUL RANLUT	BT CS CT SH SS
HUC5: CASINO/BASIN		ACCGEN AMBMAC BUFBOB RANLUT	BT CS CT SH
HUC5: LOWER EAST FORK	ASTAMB THEREP		BT CS CT SH
HUC5: SQUAW/SLATE		AMBMAC GULGUL LYNCAN RANLUT	BT CS CT SH
HUC5: UPPER EAST FORK	ASTVEN	GULGUL	
HUC5: VALLEY CREEK			CS CT SH
HUC5: YANKEE FORK	ASTPAY POLKRU	ACCGEN GULGUL RANLUT STRNEB	BT CS CT SH SS

Footnotes:

1 Data based on readily available information documenting known occurrences of sensitive resources on the Salmon-Challis National Forest, and the Inland West Watershed Initiative (IWWI) database, Conservation Data Center (CDC) database, and personal communications with Forest and District Fisheries and Wildlife Biologists. Lack of data in a table cell does not necessarily mean that a particular resource is not present in that fifth-order HUC.

2 Number in parenthesis indicates a species' number of populations documented within that fifth-order HUC in surveys conducted to date.

3 Sensitive fish species occurrences may only be documented for certain portions of fifth-order HUCs that are divided by Ranger Districts.

CATEGORY	COMMON NAME	SCIENTIFIC NAME
SENSITIVE PLANTS		
AGOLAC	PINK AGOSERIS	AGOSERIS LACKSCHEWITZII
ASTAMB	CHALLIS MILKVETCH	ASTRAGALUS AMBLYTROPIS
ASTAMN	LOST RIVER MILKVETCH	ASTRAGALUS AMNIS-AMISSI
ASTAQU	LEMHI MILKVETCH	ASTRAGALUS AQUILONIUS
ASTGIL	PLAINS MILKVETCH	ASTRAGALUS GILVIFLORUS
ASTLEP	PARK MILKVETCH	ASTRAGALUS LEPTALEUS
ASTPAY	PAYSON'S MILKVETCH	ASTRAGALUS PAYSONII
ASTVEN	WHITE CLOUDS MILKVETCH	ASTRAGALUS VEXILLIFLEXUS VAR NUBILUS
BOTMIN	MINGAN MOONWORT	BOTRYCHIUM MINGANENSE
BOUGRA	BLUE GRAMMA	BOUTELOUA GRACILIS
CARBUX	BUXBAUM'S SEDGE	CAREX BUXBAUMII
CARINI	MARITIME SEDGE	CAREX INCURVIFORMIS VAR INCURVIFORMIS
CARLIV	PALE SEDGE	CAREX LIVIDA
CARSTR	MT. SHASTA SEDGE	CAREX STRAMINIFORMIS
CASPUL	BEAUTIFUL INDIAN PAINTBRUSH	CASTILLEJA PULCHELLA
CHRTET	NORTHERN GOLDEN-CARPET	CHRYSOSPLENIUM TETRANDRUM
COLDEC	FLEXIBLE ALPINE COLLOMIA	COLLOMIA DEBILIS VAR CAMPORUM
CORVIV	CUSHION CACTUS	CORYPHANTHA VIVIPARA
CYMDOU	DOUGLASS' WAVEWING	CYMOPTERUS DOUGLASSII
CYMIBA	IBAPAH WAVEWING	CYMOPTERUS IBAPENSIS
DRAFLA	AUSTRIAN DRABA	DRABA FLADNIZENSIS
DRAINC	YELLOWSTONE DRABA	DRABA INCERTA
EATNIV	WHITE EATONELLA	EATONELLA NIVEA
EPIGIG	GIANT HELLEBORINE	EPIPACTIS GIGANTEA
ERICAW	WELSH'S BUCKWHEAT	ERIOGONUM CAPISTRATUM VAR WELSHII
ERIHUM	LOW FLEABANE	ERIGERON HUMILIS
ERISAL	SALMON RIVER FLEABANE	ERIGERON SALMONENSIS
GENPRO	FOUR-PARTED GENTIAN	GENTIANELLA PROPINQUA
GENTEN	SLENDER GENTIAN	GENTIANELLA TENELLA
HACDAV	DAVIS' STICKSEED	HACKELIA DAVISII
LEWKEL	IDAHO BITTERROOT	LEWISIA KELLOGGII
OXYBES	CHALLIS CRAZYWEED	OXYTROPIS BESSEYI VAR SALMONENSIS
PAPRAK	ARCTIC POPPY	PAPAVER RADICATUM SSP KLUANENSE
PARKOK	KOTZEBUE'S GRASS-OF-PARNASSUS	PARNASSIA KOTZEBUEI VAR KOTZEBUEI
PENLEM	LEMHI PENSTEMON	PENSTEMON LEMHIENSIS
PHALYA	LYALL'S PHACELIA	PHACELIA LYALLII
PHYDIL	SALMON TWIN BLADDERPOD	PHYSARIA DIDYMOCARPA VAR LYRATA
POAABM	MARSH'S BLUEGRASS	POA ABBREVIATA SSP MARSHII
POLKRU	KRUCKEBERG'S SWORD-FERN	POLYSTICHUM KRUCKEBERGII
RANGEL	ARCTIC BUTTERCUP	RANUNCULUS GELIDUS
RANPYG	PYGMY BUTTERCUP	RANUNCULUS PYGMAEUS
SALFAR	FARR'S WILLOW	SALIX FARRIAE

CATEGORY	COMMON NAME	SCIENTIFIC NAME
SENSITIVE PLANTS		
SAXADO	WEDGE-LEAF SAXIFRAGE	SAXIFRAGA ADSCENDENS VAR OREGONENSIS
SAXCER	NODDING SAXIFRAGE	SAXIFRAGA CERNUA
SEDBOR	BORSCH'S STONECROP	SEDUM BORSCHII
SILSCL	SCAPOSE SILENE	SILENE SCAPOSA VAR LOBATA
SILURM	PETALLESS CAMPION	SILENE URALENSIS SSP MONTANA
SULHAH	HAPEMAN'S SULLIVANTIA	SULLIVANTIA HAPEMANII VAR HAPEMANII
THEREP	WAVY-LEAF THELYPODY	THELYPODIUM REPANDUM
THLIDA	STANLEY THLASPI	THLASPI IDAHOENSE VAR AILEENIAE
SENSITIVE WILDLIFE		
ACCGEN	NORTHERN GOSHAWK	ACCIPITER GENTILIS
AEGFUN	BOREAL OWL	AEGOLIUS FUNEREUS
AMBMAC	LONG-TOED SALAMANDER	AMBYSTOMA MACRODAETYLUM
BUFBOB	WESTERN TOAD	BUFO BOREAS BOREAS
CORTOW	TOWNSEND'S BIG-EARED BAT	CORYNORHINUS TOWNSENDII
EUDMAC	SPOTTED BAT	EUDERMA MACULATUYN
FALPEA	PEREGRINE FALCON	FALCO PEREGRINUS ANATUM
GULGUL	NORTH AMERICAN WOLVERINE	GULO GULO
HALLEU	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS
LYNCAN	CANADA LYNX	LYNX CANADENSIS
MARPEN	FISHER	MARTES PENNANTI
OTUFLA	FLAMMULATED OWL	OTUS FLAMMEOLUS
PICTRI	THREE-TOED WOODPECKER	PICOIDES TRIDACTYLUS
RANLUT	COLUMBIA SPOTTED FROG	RANA LUTEIVENTRIS
STRNEB	GREAT GRAY OWL	STRIX NEBULOSA
SENSITIVE FISH		
BT	BULL TROUT	SALVELINUS CONFLUENTUS
CS	SPRING/SUMMER CHINOOK SALMON	ONCORHYNCHUS TSHAWYTSCHA
CT	WESTSLOPE CUTTHROAT TROUT	ONCORHYNCHUS CLARKI LEWISI
SH	STEELHEAD	ONCORHYNCHUS MYKISS
SS	SOCKEYE SALMON	ONCORHYNCHUS NERKA

Appendix I

Documented Occurrences of Soil Types, 303D Waterbodies, Wild & Scenic Rivers, Roadless Areas, and Research Natural Areas by Ranger District and HUCS 4 and 5 On the Salmon-Challis National Forest

Documented Occurrences of Soil Types, 303D Water Bodies, Wild & Scenic Rivers, Roadless Areas, and Research Natural Areas by Ranger District and HUCs 4 and 5 On the Salmon-Challis National Forest.

	SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
CHALLIS RANGER DISTRICT							
HUC4: LOWER MIDDLE FORK SALMON							
HUC5: UPPER CAMAS CREEK	VALLEY BOTTOM	4%					
	VOLCANIC	96%			14,762		
HUC4: MIDDLE SALMON-PANTHER							
HUC5: HAT CREEK	QUARTZITE	100%			19,299		
HUC5: IRON CREEK	VOLCANIC	100%			872		
HUC4: PAHSIMEROI							
HUC5: BIG CREEK	QUARTZITE	47%			100,611		
	SEDIMENTARY	49%					
	VOLCANIC	4%					
HUC5: LOWER PAHSIMEROI	QUARTZITE	56%			30,475		
	VOLCANIC	44%					
HUC5: MIDDLE PAHSIMEROI	QUARTZITE	63%			79,869	MILL LAKE	447
	SEDIMENTARY	25%					
	VOLCANIC	12%					
HUC5: UPPER PAHSIMEROI	SEDIMENTARY	96%	1.4		34,909	MERRIAM LAKE BASIN	775
	VOLCANIC	4%				MAHOGANY CREEK	3,618
HUC4: UPPER SALMON							
HUC5: CHALLIS CREEK	QUARTZITE	< 1%			97,363		
	SEDIMENTARY	6%					
	VALLEY BOTTOM	3%					
	VOLCANIC	90%					
HUC5: GRANDVIEW	SEDIMENTARY	61%			25,340		
	VOLCANIC	39%					
HUC5: MORGAN CREEK	QUARTZITE	< 1%			57,539		
	VOLCANIC	> 99%					
LEADORE RANGER DISTRICT							
HUC4: LEMHI BASIN							
HUC5: EIGHTEEN MILE	GRANITIC	4%			72,614		
	QUARTZITE	19%					
	SEDIMENTARY	61%					
	VALLEY BOTTOM	< 1%					

		SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
LEADORE RANGER DISTRICT								
		VOLCANIC	16%					
HUC5:	HAYDEN	QUARTZITE	79%			60,473	BEAR VALLEY CREEK	2,491
		VALLEY BOTTOM	8%				MILL LAKE	65
		VOLCANIC	13%					
HUC5:	LOWER LEMHI	QUARTZITE	77%			29,662	KENNEY CREEK	1
		VALLEY BOTTOM	< 1%					
		VOLCANIC	22%					
HUC5:	MIDDLE LEMHI	GRANITIC	4%			66,217	MILL LAKE	203
		QUARTZITE	63%					
		SEDIMENTARY	11%					
		VALLEY BOTTOM	7%					
		VOLCANIC	15%					
HUC5:	TENDOY	QUARTZITE	> 99%			26,524	KENNEY CREEK	1,591
		VOLCANIC	< 1%					
HUC5:	TIMBER CREEK	GRANITIC	2%			68,418	SHEEP MOUNTAIN	85
		QUARTZITE	48%					
		SEDIMENTARY	19%					
		VALLEY BOTTOM	11%					
		VOLCANIC	20%					
HUC4: MIDDLE SALMON-PANTHER								
HUC5:	SALMON	QUARTZITE	54%			510		
		VOLCANIC	46%					
LOST RIVER RANGER DISTRICT								
HUC4: BIG LOST								
HUC5:	ANTELOPE CREEK	GRANITIC	1%	6.5		91,191	IRON BOG	454
		SEDIMENTARY	11%				SMILEY MOUNTAIN	902
		VOLCANIC	88%					
HUC5:	ARCO	SEDIMENTARY	100%			17,066		
HUC5:	DRY CHANNEL BIG LOST RIVER	SEDIMENTARY	100%			1,490		
HUC5:	EAST FORK BIG LOST RIVER	GRANITIC	11%	46.5		174,917	SURPRISE VALLEY	1,509
		SEDIMENTARY	36%				SMILEY MOUNTAIN	2,199
		VOLCANIC	53%					
HUC5:	MACKAY	SEDIMENTARY	71%			88,448		
		VOLCANIC	29%					
HUC5:	NORTH FORK BIG LOST RIVER	GRANITIC	4%			72,725		
		SEDIMENTARY	69%					
		VOLCANIC	27%					
HUC5:	WILLOW CREEK	SEDIMENTARY	61%			96,830	MAHOGANY CREEK	79

	SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
LOST RIVER RANGER DISTRICT							
	VOLCANIC	39%					
HUC4: LITTLE LOST							
HUC5: LITTLE LOST SINKS	QUARTZITE	6%			35,841	MIDDLE CANYON	2,322
	SEDIMENTARY	94%					
HUC5: LOWER LITTLE LOST	QUARTZITE	10%			74,130	MIDDLE CANYON	18
	SEDIMENTARY	87%					
	VOLCANIC	3%					
HUC5: MIDDLE LITTLE LOST	QUARTZITE	12%	16.2		91,081	MEADOW CANYON	270
	SEDIMENTARY	74%					
	VOLCANIC	14%					
HUC5: UPPER LITTLE LOST	QUARTZITE	26%	7.2		67,920	SHEEP MOUNTAIN	324
	SEDIMENTARY	45%					
	VOLCANIC	29%					
HUC4: PAHSIMEROI							
HUC5: BIG CREEK	SEDIMENTARY	100%			1,509		
MIDDLE FORK RANGER DISTRICT							
HUC4: LOWER MIDDLE FORK SALMON							
HUC5: LOWER CAMAS CREEK	GRANITIC	3%			78	DRY GULCH-FORGE CREEK	< 1
	VOLCANIC	97%					
HUC5: UPPER CAMAS CREEK	VALLEY BOTTOM	5%			717		
	VOLCANIC	95%					
HUC5: YELLOWJACKET	GRANITIC	100%			< 1		
HUC4: UPPER MIDDLE FORK SALMON							
HUC5: BEAR VALLEY	QUARTZITE	45%			239		
	VALLEY BOTTOM	55%					
HUC5: DAGGER FALLS	QUARTZITE	92%		97	4,507		
	VALLEY BOTTOM	8%					
HUC5: LOWER LOON CREEK	QUARTZITE	42%			469		
	VALLEY BOTTOM	3%					
	VOLCANIC	55%					
HUC5: MARSH CREEK	QUARTZITE	94%			4,452		
	VALLEY BOTTOM	5%					
	VOLCANIC	1%					
HUC5: PISTOL CREEK	NOT CLASSIFIED				1,965		
HUC5: RAPID RIVER	QUARTZITE	95%			30,680		
	VALLEY BOTTOM	5%					
HUC5: THOMAS-LITTLE LOON	QUARTZITE	100%			212		
HUC5: UPPER LOON CREEK	QUARTZITE	40%			47,565	MYSTERY LAKE	526

	SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
MIDDLE FORK RANGER DISTRICT							
	VALLEY BOTTOM	5%					
	VOLCANIC	55%					
HUC5: WARM SPRINGS CREEK	VALLEY BOTTOM	2%			1,872		
	VOLCANIC	98%					
NORTH FORK RANGER DISTRICT							
HUC4: LEMHI BASIN							
HUC5: LOWER LEMHI	QUARTZITE	92%			581		
	VALLEY BOTTOM	8%					
HUC4: MIDDLE SALMON-CHAMBERLAIN							
HUC5: CORN-KITCHEN	GRANITIC	> 99%	< 1	1,293	17,976	GUNBARREL	38
	VALLEY BOTTOM	< 1%					
HUC5: HORSE CREEK	GRANITIC	99%			21,495		
	VALLEY BOTTOM	1%					
HUC4: MIDDLE SALMON-PANTHER							
HUC5: COLSON-OWL	GRANITIC	99%		2,104	53,729	COLSON CREEK	287
	QUARTZITE	< 1%					
	VALLEY BOTTOM	1%					
HUC5: DEADWATER	GRANITIC	47%	< 1	3,576	27,827		
	QUARTZITE	50%					
	VALLEY BOTTOM	3%					
HUC5: INDIANOLA	GRANITIC	37%		70	45,645		
	QUARTZITE	61%					
	VALLEY BOTTOM	2%					
HUC5: NORTH FORK	GRANITIC	5%		4	135,378	ALLAN MOUNTAIN	1,739
	QUARTZITE	88%					
	VALLEY BOTTOM	3%					
	VOLCANIC	4%					
HUC5: RED ROCK	GRANITIC	7%			52,316	DAVIS CANYON	1,201
	QUARTZITE	85%					
	VALLEY BOTTOM	3%					
	VOLCANIC	5%					
HUC5: SHOUP	GRANITIC	80%		5,305	63,365		
	QUARTZITE	19%					
	VALLEY BOTTOM	2%					
SALMON COBALT RANGER DISTRICT							
HUC4: LOWER MIDDLE FORK SALMON							
HUC5: LOWER CAMAS CREEK	GRANITIC	13%			47,092	DRY GULCH-FORGE CREEK	1,358
	QUARTZITE	2%					

	SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
SALMON COBALT RANGER DISTRICT							
	VALLEY BOTTOM	1%					
	VOLCANIC	84%					
HUC5: UPPER CAMAS CREEK	VALLEY BOTTOM	3%			16,487		
	VOLCANIC	97%					
HUC5: YELLOWJACKET	GRANITIC	37%			33,624	FROG MEADOWS	71
	QUARTZITE	59%					
	VALLEY BOTTOM	< 1%					
	VOLCANIC	3%					
HUC4: MIDDLE SALMON-PANTHER							
HUC5: DEADWATER	GRANITIC	62%	< 1	9	35,187		
	QUARTZITE	36%					
	VALLEY BOTTOM	2%					
HUC5: DEEP-MOYER	GRANITIC	< 1%			71,192		
	QUARTZITE	93%					
	VALLEY BOTTOM	< 1%					
	VOLCANIC	6%					
HUC5: HAT CREEK	QUARTZITE	20%			30,328		
	VOLCANIC	80%					
HUC5: IRON CREEK	QUARTZITE	59%			49,104		
	SEDIMENTARY	3%					
	VALLEY BOTTOM	3%					
	VOLCANIC	35%					
HUC5: LOWER PANTHER CREEK	GRANITIC	53%		37	41,879		
	QUARTZITE	47%					
HUC5: MIDDLE PANTHER	GRANITIC	23%			61,489		
	QUARTZITE	77%					
HUC5: NAPIAS	GRANITIC	24%			56,383		
	QUARTZITE	57%					
	VALLEY BOTTOM	2%					
	VOLCANIC	17%					
HUC5: RED ROCK	GRANITIC	14%	6.6	< 1	20,955		
	QUARTZITE	72%					
	VALLEY BOTTOM	5%					
	VOLCANIC	9%					
HUC5: SALMON	GRANITIC	7%			50,114		
	QUARTZITE	62%					
	VOLCANIC	31%					
HUC5: SHOUP	GRANITIC	94%		3	1,824		

	SOIL TYPES	(%)[1]	303D (Miles)	WILD & SCENIC RIVER[2] (Acres)	ROADLESS (Acres)	RESEARCH NATURAL AREAS	(Acres)
SALMON COBALT RANGER DISTRICT							
	QUARTZITE	6%					
HUC5: TWELVE/LAKE	QUARTZITE	52%			51,750		
	SEDIMENTARY	6%					
	VOLCANIC	42%					
HUC5: UPPER PANTHER	QUARTZITE	46%			56,197		
	VALLEY BOTTOM	2%					
	VOLCANIC	52%					
YANKEE FORK RANGER DISTRICT							
HUC4: UPPER MIDDLE FORK SALMON							
HUC5: MARSH CREEK	QUARTZITE	91%			67,814		
	VALLEY BOTTOM	7%					
	VOLCANIC	2%					
HUC5: UPPER LOON CREEK	QUARTZITE	13%			1,077	MYSTERY LAKE	< 1
	VOLCANIC	87%					
HUC4: UPPER SALMON							
HUC5: BAYHORSE	SEDIMENTARY	53%			23,694		
	VALLEY BOTTOM	2%					
	VOLCANIC	45%					
HUC5: BIG LAKE/BOULDER	VOLCANIC	100%			7,481		
HUC5: CASINO/BASIN	QUARTZITE	56%			45,835		
	VALLEY BOTTOM	3%					
	VOLCANIC	41%					
HUC5: LOWER EAST FORK	VOLCANIC	100%			64,378		
HUC5: SQUAW/SLATE	SEDIMENTARY	1%	13.8		67,228		
	VALLEY BOTTOM	3%					
	VOLCANIC	96%					
HUC5: UPPER EAST FORK	VOLCANIC	100%			11,134		
HUC5: VALLEY CREEK	QUARTZITE	88%			15,271		
	VALLEY BOTTOM	8%					
	VOLCANIC	4%					
HUC5: YANKEE FORK	QUARTZITE	1%	9.5		120,115	MYSTERY LAKE	< 1
	VALLEY BOTTOM	4%					
	VOLCANIC	95%					

Footnote:

(1) Percent soil type for HUC5 within given district.

(2) Acres within a 1/2-mile-wide buffer.

Appendix J

Characteristics of Herbicides Discussed for Chemical Treatment Options in this Environmental Impact Statement

TABLE J-1
Characteristics and Properties of Herbicides

	Herbicide Properties			Behavior in Soils			Behavior in Water		Degradation Mechanism			Toxicity & EPA Toxicity Categories[e]					
Herbicide and Chemical Name	**Examples of Available Products**	**Target Weed Species**	**Mode of Action**	**Average Soil Half-life[a]**	**Soil Sorption (Koc)[b]**	**Mobility[c]**	**Water Solubility[d]**	**Average Half-life in Water**	**Microbial**	**Chemical**	**Solar**	**Oral LD50: Mammals[f]**	**LD50: Birds[g]**	**LC50: Fish[h]**	**Dermal LD50: Rabbit**	**Application Rate[i]**	**Notes**
2,4 D (2,4-dichlorophenoxy) acetic acid	Navigate®, Class®, Weed-Pro®, Justice® Weedar 64, Weed-B-Gon	broadleaf weeds	Auxin mimic	10 days	20 mL/g (acid/salt), 100 mL/g (ester)	moderate-high	900 mg/L (acid), 100 mg/L (ester), 796,000 mg/L (salt)	varies from hours to months	Primary mechanism	Minor mechanism	Low potential	764 mg/kg [low]	500 mg/kg (BW) [moderate]	263 mg/L [moderate]	>2,000 mg/kg	0.475 to 4.0 pounds per acre Typical S-CNF = 0.5 to 1.5 pounds per acre Maximum label = 4.0 pounds per acre	Inexpensive and common herbicide used for over 50 years.
Chlorsulfuron 2-chrloro-N-[(4-methoxy-6-methyl-1,3,5-triazin-2-yl) aminocarbonyl)] benzenesulfonamide	Telar®	broadleaf weeds and some annual grass weeds	Stops production of an amino acid, which inhibits cell division in roots	1 to 3 months	no data available	high	no data available	no data available	no data available	no data available	no data available	<5,000 mg/kg [low]	<5,000 mg/kg (BW, M) [low]	<300 ppm [low]	>3,400 mg/kg	0.25 to 3.0 ounces per acre Typical S-CNF = 0.25 to 3.0 ounces per acre Maximum label = 3.0 ounces per acre	Practically nontoxic to fish, birds, and mammals
Clopyralid 3,6-dichloro-2-pyridinecarboxylic acid	Reclaim®, Curtail®, Transline®	annual and perennial broadleaf weeds	Auxin mimic	40 days	avg 6 mL/g but ranges to 60 mL/g	moderate-high	1,000 mg/L (acid), 300,000 mg/L (salt)	8-40 days	Primary mechanism	Minor mechanism	Low potential	4,300 mg/kg [low]	1,465 mg/kg (M) [low]	125 mg/L [moderate]	>2,000 mg/kg	0.0625 to 0.5 pound per acre Typical S-CNF = 0.1 to 0.375 pound per acre Maximum label = 0.5 pound per acre	Highly selective herbicide developed as an alternative to picloram.
Corn Gluten Meal	WOW!®, Bio-Weed®	broadleaf weeds and annual and perennial grasses	Inhibits the growth of a seed's feeder roots by breaking down the cell wall, so seedlings cannot hold moisture.	5 to 6 weeks	no data available	no data available	no data available	no data available	no data available	no data available	no data available	no data available	no data available	no data available	no data available	20 pounds per 1,000 square feet	Corn gluten is a by-product of wet milling process to make cornstarch. It is an animal feed for cattle, poultry, other livestock, fish and some dog foods.
Dicamba 3,6-dichloro-2-methoxybenzoic acid	Banvel®, Banex®, Trooper®	broadleaf weeds, vines, and brush	Growth regulator	1 to 6 weeks	no data available	high	6,500 mg/L	no data available	Primary mechanism	Very minor mechanism	Very low potential	566 to 3,000 mg/kg [low]	673 to 2,000 mg/kg [low]	>100 ppm [low]	2,000 mg/kg (note: rat, not rabbit)	0.25 to 2 pounds per acre. Maximum S-CNF = 2 pounds per acre per year on a treatment area.	Does not injure most grasses. It will kill broadleaf weeds before and after they sprout.
Fosamine ethyl hydrogen (aminocarbonyl) phosphonate	Krenite®	trees and bushes	Mitotic inhibitor	8 days	150 mL/g	moderate[b]	1,790,000 mg/L	stable in water	Primary mechanism	Very minor mechanism	Very low potential	24,000 mg/kg [slight]	10,000 mg/kg (BW/M) [slight]	670 mg/L [low]	>1,683 mg/kg	6 to 12 pounds per acre	Not registered for use in California or Arizona.

TABLE J-1
Characteristics and Properties of Herbicides

Herbicide Properties				Behavior in Soils			Behavior in Water		Degradation Mechanism			Toxicity & EPA Toxicity Categories[e]					
Herbicide and Chemical Name	**Examples of Available Products**	**Target Weed Species**	**Mode of Action**	**Average Soil Half-life[a]**	**Soil Sorption (Koc)[b]**	**Mobility[c]**	**Water Solubility[d]**	**Average Half-life in Water**	**Microbial**	**Chemical**	**Solar**	**Oral LD50: Mammals[f]**	**LD50: Birds[g]**	**LC50: Fish[h]**	**Dermal LD50: Rabbit**	**Application Rate[i]**	**Notes**
Glyphosate N-(phosphonomethyl) glycine	RoundUp®, Rodeo®, Accord®	annual and perennial weeds	Inhibits the shikimac acid pathway, depleting aromatic amino acids	47 days	24,000 mL/g	low	15,700 mg/L (acid), 900,000 mg/L (IPA salt), 4,300,000 mg/L	12 days to 10 weeks	Primary mechanism	Minor mechanism	Low potential	5,600 mg/kg [slight]	> 4,640 mg/kg (BW/M) [low]	120 mg/L [moderate]	>5,000 mg/kg	0.3 to 3.75 pounds per acre Typical S-CNF = 0.5 to 2.0 pounds per acre Maximum label = 3.75 pounds per acre	Little to no soil activity. Some formulations are highly toxic to aquatic organisms.
Imazapic (±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid	Plateau®, Plateau Eco-Pak®, Cadre®	annual and perennial weeds	Inhibits AHAS synthesis, blocking amino acid synthesis	120-140 days	206 mL/g	low?	36,000 mg/L (pH 7)	< [illegible] hours	Primary mechanism	Very minor mechanism ?	Low?	> 5,000 mg/kg [slight]	> 2,150 mg/kg (BW) [low]	> 100 mg/L [moderate]	> 5,000 mg/kg	Typical S-CNF = 0.06 to 0.2 pound per acre Maximum label = 0.75 pound per acre	Degree of control depends on selectivity of individual plants.
Metsulfuron methyl Methyl-2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)-amino]carbonyl]amino] sulfonyl]benzoate	Escort®, Ally®	brush, woody plants, annual and perennial broadleaf and annual grassy weeds	Inhibits cell division and stops growth	120 to 180 days	no data available	no data available	109 mg/L	29 to >84 days	no data available	no data available	no data available	> 5,000 mg/kg [low]	<2,150 mg/kg [low]	<150 ppm [low]	>2,000 mg/kg [low]	0.33 to 2.0 ounces per acre Typical S-CNF = 0.25 to 0.75 ounce per acre Maximum label = 2.0 ounces per acre	Will leach in some soils, but is practically nontoxic to birds, fish, invertebrates, and honeybees.
Pelargonic acid C8H17COOH natural fatty acid	Scythe®	annual and perennial broadleaf and grass weeds, as well as most mosses and other cryptogams	Disrupts cell membrane permeability, which results in cell leakage and death of all contacted tissue	no data available	no data available	no data available	no data available	no data available	Primary mechanism	no data available	no data available	>5,000 mg/kg	no data available	no data available	>2,000 mg/kg	9.45 pounds to 84 pounds per acre	Pelargonic acid has been found to occur naturally in low concentrations in soil. It is considered safe for humans and non-toxic.

TABLE J-1
Characteristics and Properties of Herbicides

Herbicide Properties				Behavior in Soils			Behavior in Water		Degradation Mechanism			Toxicity & EPA Toxicity Categories[e]					
Herbicide and Chemical Name	**Examples of Available Products**	**Target Weed Species**	**Mode of Action**	**Average Soil Half-life[a]**	**Soil Sorption (Koc)[b]**	**Mobility[c]**	**Water Solubility[d]**	**Average Half-life in Water**	**Microbial**	**Chemical**	**Solar**	**Oral LD50: Mammals[f]**	**LD50: Birds[g]**	**LC50: Fish[h]**	**Dermal LD50: Rabbit**	**Application Rate[i]**	**Notes**
Picloram 4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid	Tordon K®	annual and perennial broadleaf weeds, vines, and woody plants	Auxin mimic	90 days	16 mL/g (can range -17-160 mL/g)	moderate-high	430 mg/L (acid), 200,000 (salts)	2-3 days	Primary mechanism	Primary mechanism	Moderate potential	> 5,000 mg/kg [slight]	> 2,510 mg/kg (M) [low]	>14.4 mg/L [high]	>2,000 mg/kg	• As triisopro-panolamine salt: 0.27 to 2.16 pounds per acre • As isooctyl ester: used for basal bark treatment • As potassium salt: 1.0 to 8.5 pounds per acre Typical S-CNF = 0.125 to 0.50 pound per acre Maximum label = 1.0 pound per acre	Environmental persistence can endanger non-target plants and animals.
Sulfometuron methyl methyl 2-[[[[(4,6-dimethyl-2-pyrimidinyl) amino]carbonyl]amino] sulfonyl]benzoate	Oust Weed Killer®, DPX 5648®	annual and perennial grasses and broadleaf weeds	Inhibits cell division in tips, roots, and shoots	1 month	no data available	moderate-high	Insoluble	1 to 3 days	Primary mechanism	Primary mechanism	High potential	>5,000 mg/kg [slight]	<5,620 ppm (BW) and <5,000 ppm (M) [slight]	<12.5 ppm [slight]	>2,000 mg/kg	Up to 2.25 ounces per acre Typical S-CNF = 0.25 to 0.75 ounce per acre Maximum label = 2.25 ounces per acre	Readily absorbed through the gastrointestinal tract and rapidly broken down and removed.
Triclopyr [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid	Garlon®, Remedy®	woody and annual broadleaf weeds	Auxin mimic	30 days	20 mL/g (salt), 780 mL/g (ester)	moderate-high	430 mg/L (acid), 23 mg/L (ester), 2,100,000 mg/L (salt)	4 days	Primary mechanism	Minor mechanism	Moderate potential	713 mg/kg [low]	1,698 mg/kg (M) [low]	148 mg/L [moderate]	>2,000 mg/kg	0.25 to 9 pounds acid equivalent per acre	Commonly used herbicide. The ester formulation is highly toxic to aquatic organisms.

Adapted from Weed Control Methods Handbook, The Nature Conservancy, Tu et al. 2001. Other sources include Environmental Health Clearinghouse 2002, EXTOXNET 2002, PEMP 2002, and Wisconsin Master Gardener Program 2002.

[a] Half-life: The time required for half of something to undergo a process. As used in this document, it is the amount of time for half the herbicide to break down, becoming ineffective.

[b] Koc: The partitioning of a chemical between soil or sediment, usually expressed as K (the concentration of a chemical in soil (ug/g) to that in water (ug/ml)) or as Koc (which is K divided by the organic carbon content of the soil or sediment). The higher the number, the more binding the herbicide is to soil particles.

[c] Mobility: Relating to the capability of moving or being moved.

[d] Based on Helling's classification system - Helling & Turner 1968 (as cited in Tu et al. 2001). Solubility: The quality or state of being soluble. Expressed in this document as the quantity of a herbicide that can be dissolved in water.

[e] Based on EPA Toxicity Categories

[f] Rats

[g] BW—bobwhite quail; M—mallards

[h] bluegill sunfish

[i] Application rates for "Typical S-CNF" and "Maximum Label" are from the S-CNF 2002 Programmatic Biological Assessment for Fish (U.S. Forest Service 2002).

TABLE J-2
Worksheet for Assessing Risk Quotient Values and Levels of Concern for Aquatic Species Associated with Herbicide Applications

Methodology for Determining Level of Concern	Example using 2,4-D
Maximum application rate (known constant based on label rates)	3 lb ai/ac (pounds active ingredient per acre)
EEC—Estimated Environmental Concentration (from Urban and Cook [1986] table based on direct application to a pond 1 acre-foot in volume) measured in ppb (parts per billion), and converted to ppm (parts per million)	at 3 lb ai/ac, in 1 acre-foot water, the EEC = 1103 ppb or 1.103 ppm
Toxicity—The 96-hour LC50 (a standard test) for a specific aquatic species. The LC50 is the concentration of a toxicant that causes mortality in 50% of the test organisms under a specific set of conditions.	LC50 = 250 mg/L (milligrams per liter), or = 250 ppm (testing conducted with rainbow trout)
Safety Factor—A divisor applied to the toxicity value to establish a concentration below which risk is acceptable (as determined by EPA). For endangered aquatic species, EPA uses 1/20 of the LC50 value.	1/20 of the LC50 = 12.5 ppm (250 ppm x 1/20 = 12.5 ppm)
The EPA has determined that there is a presumption of unacceptable risk to endangered aquatic species if the EEC > 1/20 LC50. Conversely, if the EEC < 1/20 LC50, the application rate used to calculate the EEC should not result in an unacceptable risk to endangered aquatic species.	For 2,4-D amine, where: EEC = 1.103 ppm at 3 lb ai/ac maximum application rate 1/20 the LC50 = 12.5 ppm EEC is < 1/20 of the LC50
Because of some of the concerns associated with this level of concern (risk) analysis [(see Table 4 in Urban and Cook (1986)] and because the EPA does not define a magnitude of risk of endangered species, especially when the EEC < 1/20 LC50, a gradual "level of concern" scale was developed based on how close the EEC value is to the 1/20 LC50. The 1/20 LC50 value is divided by the EEC value and the quotient represents the level of concern for a given herbicide. The level of concern scale is as follows: If the 1/20 LC50 ÷ EEC is a quotient of >10, the level of concern is low. If the 1/20 LC50 ÷ EEC is a quotient of >1 but ▸10, the level of concern is moderate. If the 1/20 LC50 ÷ EEC is a quotient of ▸1, the level of concern is high.	For 2,4-D amine: 1/20 the LC50 = 12.5 ppm EEC = 12.5 ppm ÷1.103 ppm = 11 Since the quotient is >10, the level of concern is low.

TABLE J-3
Toxicology Profile of Herbicides Used or Proposed for Use on the S-CNF

	Transline[1]	Weedar 64[2]	Rodeo[3]	Escort[4]	Tordon 22K[5]	Telar[6]	Plateau[7]	Oust[8]	Banvel[9]	Krenite[10]	Garlon[11]
Toxicology	**Clopyralid**	**2,4-D**	**Glyphosate**	**Metsulfuron Methyl**	**Picloram**	**Chlorsulfuron**	**Imazapic**	**Sulfometuron Methyl**	**Dicamba**	**Fosamine**	**Triclopyr**
Rainbow Trout (96 hr LC50) (mg/L)	103	250	>1000	>150	5.5-19.3	250	>100	12.5	28	1,000	117
Daphnia (96 hr LC50) (mg/L)	232	184	930	>12.5 (48 hr)	68.3	>370	>100	125	100	—	1,140
Bio-accumulates	No	No	No	No	No	No	No	No	No	No	No
Persistence in soil[12]	40 Days (Moderate)	10 Days (Low)	47 Days (Moderate)	30 Days (1-4 Wks) (Low)	90 Days (20-300) (Mod-High)	40 Days (4-6 Wks) (Low-Mod)	7-150 Days Low-High	20-28 Days (Low)	7-42 days (Low-Mod)	8 days (Low)	30 days (Low)
Mobile in soil	No	Yes, but degrades quickly	No	No	Yes	No	No	No	Yes	Yes	Yes

[1]U.S. Forest Service 1999a. Clopyralid Risk Assessment—Final Report.

[2]U.S. Forest Service 1999b. 2,4-Dichlorophenoxyacetic Acid Formulations Risk Assessment—Final Report.

[3]U.S. Forest Service 1999d. Glysophate Risk Assessment.

[4]Ahrens 1994. Herbicide Handbook, Seventh Edition.

[5]U.S. Forest Service 1999e. Picloram Risk Assessment—Final Report.

[6]U.S. Forest Service 1995a. Chlorsulfuron Pesticide Fact Sheet.

[7]U.S. Forest Service 1999f. Imazapic Risk Assessment—Final Report.

[8]U.S. Forest Service 1999g. Sulfometuron Methyl Risk Assessment—Final Report

[9]U.S. Forest Service 1995b: Dicamba Pesticide Fact Sheet. U.S. Forest Service 2001c: Sandpoint Ranger District FEIS. Appendix Table J-1.

[10]http://pmep.cce.cornell.edu/profiles/herb (1985). Fosamine Herbicide Profile. Appendix Table J-1.

[11]U.S. Forest Service 1995c: Triclopyr Pesticide Fact Sheet. Appendix Table J-1.

[12]Soil half-life values for herbicides are from Herbicide Handbook (Ahrens 1994) Pesticides that are considered non-persistent are those with a half-life of less than 30 days; moderately persistent herbicides are those with a half-life of 30 to 100 days; pesticides with a half-life of more than 100 days are considered persistent.

TABLE J-4
Aquatic Level of Concern Assessment for Herbicides Used on the S-CNF

Active Ingredient	Product Name	Typical Application Rate lb ai/ac[1]	Max Label Application Rate lb ai/ac[2]	EEC (ppm)[3]	Toxicity 96-hour LC50 (mg/L)[4]	Safety Factor 1/20 LC50 (mg/L)	Species Tested	Risk Quotient and Level of Concern[5]
Clopyralid	Transline	0.1-0.375	0.5	0.184	103	5.2	Rainbow Trout	28 Low
2,4-D amine	Amine 4, Weedar 64	0.5-1.5	3.0	1.103	250	12.5	Rainbow Trout	11 Low
Glyphosate	Rodeo	0.5-2.0	3.75	1.379	1000	50	Rainbow Trout	36 Low
Metsulfuron-methyl	Escort	0.25-0.75	2.0 oz	0.046	150	7.5	Rainbow Trout	163 Low
Picloram [6]	Tordon 22K	0.125-0.5	1.0 [2]	0.368	19.3	0.965	Rainbow Trout	2 Moderate
Chlorsulfuron	Telar DF	0.25-3.0	3.0 oz	0.052	250	12.5	Rainbow Trout	240 Low
Imazapic	Plateau	0.06-0.2	0.75	0.276	100	5.0	Rainbow Trout	18 Low
Sulfometuron -methyl	Oust	0.25-0.75	2.0 oz	0.046	12.5	0.625	Rainbow Trout	161 Low
Dicamba [7]	Banvel	0.25-2.0	2.0	0.735	28	1.4	Rainbow Trout	1.9 Moderate
Fosamine [8]	Krenite	6.0-12.0	12.0	4.412	1,000	50	Rainbow Trout	11 Low
Triclopyr [9]	Garlon	0.25-9.0	9.0	3.309	117	5.85	Trout	1.7 Moderate

[1]Application rates are based upon typical and maximum label rates unless otherwise noted.

[2]Maximum application rate for picloram is 1 lb per acre; Rates may be higher for smaller portions of the acre, but the total use on the acre cannot exceed 1 lb ai/ac/yr.

[3]Hazard Evaluation Division, Standard Evaluation Procedure--Ecological Risk Assessment (Urban and Cook 1986). Concentrations derived from Table 2 (Page16) of Urban and Cook (1986) based upon application rate (lbs ai/ac) and 1 foot water depth.

[4]Rainbow Trout LC50 values from Herbicide Handbook, Seventh Edition (Ahrens1994) and individual U.S. Forest Service Pesticide Fact Sheets and Risk Assessments (see Table 12 footnotes above).

[5]The Risk Quotient and Level of Concern for a mixture of herbicides would reflect the values associated with the mixture's most toxic component. For example, the Level of Concern for a mixture of 2,4-D amine and picloram would be Moderate, reflecting calculations based upon the higher toxicity of picloram.

[6]Risk Quotient values for picloram reflect the range of LC50 toxicity value of 5.5 to 19.3 mg/L identified by various observers. Level of Concern would be Moderate for LC50 values above 7.3 mg/L, including the midpoint value of 12.4 mg/L. Level of Concern would be high based upon LC50 values from 5.5 to 7.3 mg/L.

[7]Dicamba application rates on the S-CNF are 1 lb per acre for broadcast applications and no more than 2 lb per acre per year on a treatment area, per label requirements for rangeland uses. LC50 value from Dicamba Pesticide Fact Sheet (U.S. Forest Service 1995b) and Sandpoint Ranger District FEIS (2001c).

[8]Fosamine application rates and LC50 value from http://pmep.cce.cornell.edu/profiles/herb (1985).

[9]Triclopyr application rates and LC50 value from Triclopyr Pesticide Fact Sheet (U.S. Forest Service 1995c).

TABLE J-5
Buffers, Maximum Wind Speed, Application Methods, and Herbicide Restriction Associated with Aquatic Habitats, Riparian Areas, and Wetland Resources on the S-CNF

Buffer	Maximum Wind Speed [1]	Herbicide Application Method	Herbicides Authorized (Aquatic Level of Concern-see Tables above)
>100 feet from open water	10 mph	All ground/broadcast spraying	Low[2], Moderate[3]
<100 feet from open water, but >50 feet from open water	10 mph 5 mph picloram	Spot spraying, wicking, dipping, painting, and injecting	Low[2], Moderate[3]
<50 feet from open water, but >15 feet from open water	5 mph	Spot spraying, wicking, dipping, painting, and injecting.	Low[2]
<15 feet from open water	5 mph	Spot spraying, wicking, dipping, painting, and injecting	Low, but aquatic approved herbicides only[4] No adjuvants

[1]Beufort Wind Scale Information Summaries will be distributed to field applicators to assist in assessing ambient wind conditions.

[2]Low Level of Concern for Aquatic Species: Transline, Weedar 64, Amine 4, Rodeo, Escort, Telar DF, Plateau, Oust, Krenite.

[3]Moderate Level of Concern for Aquatic Species: Tordon 22K, Banvel, Garlon.

[4]Aquatic approved herbicides: Rodeo, Weedar 64.

Appendix K

Summary of Public Scoping Comments

APPENDIX K

Summary of Public Scoping Comments

Responder	Organization	Date Rec'd	Summary of Comments
1) Marx Hintze		12/26/01 e-mail	Desires to be involved as a supplier of goats for controlled grazing strategy.
2) Allan Purcell		12/26/01	Employ least expensive control methods possible. Would like to see sheep used to control weeds.
3) Roger Warner	ID Department of Water	12/26/01	IDWR permit required for in-stream alteration work.
4) Gene Kantack		12/26/01 card	Concern with knapweed on forest encroaching onto his private ground.
5) Win Turner		12/26/01 card	Private property along Hwy 93 is a knapweed source.
6) James Lukens	IDFG	12/28/01	Incorporate information from Lemhi CWMA. Define/delineate big game winter and critical sage grouse habitat (will help with maps). Consult with IDFG prior to treatment in these areas. Incorporate Idaho Sage Grouse Management Plan in the review process.
7) Esther Keppner		12/28/01	No need to control except possibly in some places. Many animals depend on them for food. The land will take care of itself.
8) Glen Secrist	ID State Department of Agriculture	12/28/01 via e-mail	Full support of full complement of control strategies.
9) Douglas Brewer		12/28/01 card	Opposed to any road or trail closing.
10) George Nichols		1/4/02 via e-mail	Concern is this action will result in another excuse to close roads or limit access.
11) Ryan Shaffer	Alliance for the Wild Rockies	1/7/02	In support of chemical use with extreme care of application. Strengthen preventive measures to eliminate known causes of weed spread. Requests an alternative that takes a hard look at human-caused weed spread actions.

Responder	Organization	Date Rec'd	Summary of Comments
12) Seth Beal	Butte County Commissioner	1/8/02 Arco public meeting form	Supports full complement of control strategies. Cooperation and coordination are key.
13) Jim Hawkins	Custer County Extension Agent CCCWWA Coordinator	1/9/02 Challis public meeting form	Include mechanism to allow new chemicals not specifically addressed in EIS. Prevention and education needs to be an integral part of any alternative. Need to maintain funding levels. Containment zones need to consider other factors besides size. Need mechanism to treat areas not site-specifically identified or analyzed. Need to extend project area beyond the forest boundary (include Upper Salmon River WS into SNRA).
14) Craig Newman		1/9/02 Challis public meeting form	Include mechanism to allow new chemicals not specifically addressed in EIS. Need mechanism to treat areas not site-specifically identified or analyzed. EPA has set restrictions and guidelines—there should be no need to establish additional rules and regulations.
15) Rick Philps		1/9/02 Challis public meeting form	Include mechanism to allow new chemicals not specifically addressed in EIS. Don't set goals with limiting factors (# acres, amount of chemical). Opposes No Treatment Alternative. Use local knowledge in identifying weed locations.
16) E.C. Anderson		1/10/02 card	Supports full complement of control strategies. Include mechanism to add additional species not specifically addressed in EIS.
17) Rodger Sorenson		1/15/02 e-mail	Supports full complement of control strategies. Opposes closing or further limiting access.

Responder	Organization	Date Rec'd	Summary of Comments
18) Joe Tonsmeire	Wilderness River Outfitters	1/15/02	Early action is more cost effective than later. Roads are highest priority. Roads not infested should be closed in late summer through fall. Close jeep trails and ATV use. Bio control most effective long-term treat. Expand/strengthen prevention (weed-free hay, education).
19) Gerald Robinson		1/22/02 mailed comment form from 1/9/02 Challis meeting	There are no areas 'weed free'. Supports full complement of control strategies. Include mechanism to allow new chemicals not specifically addressed in EIS. Closely analyze impacts to resources by weeds. Highest priority should be roads and trails. Treat from outside-in to reduce expansion.
20) Chuck Wells	ID Department of Parks and Recreation	1/28/02	Opposes road/trail closures or restrictions. Expand/strengthen prevention (weed-free hay, education).
21) Marge Welch	Property Rights Congress of America (PRC)	1/30/02 e-mail	No adverse impacts to ongoing multiple uses (timber, grazing, mining, recreation). Opposes road or trail closures. No adverse economic, cultural, or social impacts to forest users. No impact to private property or rights. Do not expand target species to all non-native species. Include the Frank Church Wilderness in project area.

Responder	Organization	Date Rec'd	Summary of Comments
22) Katie Fite	Committee for Idaho's High Desert (CIHD)	1/31/02 e-mail 2/4/02 letter version	Eliminate livestock as being the primary vector of seed disbursal and site disturbance. Include livestock grazing's role as direct, indirect, and cumulative impacts of weeds to all stated issues. Oppose chemical except as last resort. Focus on prevention by elimination of human-caused infestation sources. Favors road and trail closures. Oppose prescribed burning. Oppose vegetation manipulations (tree thinning). All alternatives identify "at risk" areas and areas infested and eliminate sources of weed infestation (grazing, roads, trails, thinning, burning) throughout.
23) Jim Hawkins	Custer County Commissioner	1/31/02	Need to extend project area beyond the forest boundary (include Upper Salmon River WS into SNRA).

Appendix L

Programmatic Biological Evaluation of Effects of the Noxious Weed Management Program On Lands Administered by the Salmon-Challis National Forest on U. S. Forest Service Sensitive Plant, Wildlife, and Fish Species November, 2002 Salmon-Challis National Forest Salmon, Idaho

APPENDIX L

Programmatic Biological Evaluation of the Effects of the Noxious Weed Management Program on Sensitive Species of the Salmon-Challis National Forest

I. Introduction

This Biological Evaluation (BE) describes the potential effects on U. S. Forest Service (Forest Service) sensitive plant, wildlife, and fish species from implementing the Noxious Weeds Management Program on lands administered by the Salmon-Challis National Forest (S-CNF). Potential impacts on federally listed, proposed, and candidate plant, wildlife, and fish species are addressed in a separate Biological Assessment (BA) that is being submitted to the U. S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). This BE summarizes information presented in the foregoing Environmental Impact Statement (EIS) and appendices that is relevant to those Forest Service sensitive species occurring on the S-CNF. To avoid unnecessary repetition, the reader is referred to sections of the EIS for additional detail on the Proposed Action (Chapter 2), the project area affected environment (Chapter 3), and the potential direct, indirect, and cumulative environmental consequences on resources from implementing the Proposed Action (Chapter 4). In addition, all references incorporated in this BE are included in Chapter 9 of the EIS. Appendix G of the EIS contains consultation letters from the USFWS on federally protected species that may be present in the S-CNF project area.

This BE, and its assessment of potential project effects on S-CNF sensitive species, is programmatic in nature because of the large size and diverse landscape of the S-CNF and the extent of noxious weed infestations present on the S-CNF. The project area covers more than 3 million acres on the S-CNF, excluding the Frank Church River of No Return Wilderness (FCRONW), and contains more than 66,000 acres of inventoried weed infestations at over 2,500 sites. Map 1-1 in Chapter 1 of the EIS shows the boundaries of the S-CNF and its location in Idaho. Map 3-1 in Chapter 3 of the EIS depicts noxious weed infestations on and near the S-CNF.

More than 40 weed species are considered in this analysis, including species designated as "noxious" by the State of Idaho and additional invasive species found on or near the S-CNF. Weed species that occur on the S-CNF are referred to as established invaders (9 species) or new invaders (15 species), while those that occur near the S-CNF are referred to as potential invaders (23 species). Table 2-1 in Chapter 2 of the EIS lists the common and scientific names of these species and their occurrence on the S-CNF by Ranger District. Consistent with project purpose and need described in *Section 1.C, Purpose and Need for Action*, the S-CNF proposes to implement an integrated series of weed treatment and non-treatment practices under the Proposed Action that would eradicate, reduce, and/or slow the spread of noxious

and invasive non-native populations of weeds on the S-CNF (*Section 2.C.1, Treatment Practices)*. Expeditious treatment can prevent further spread and expansion of existing weed infestations, and maintain and enhance native plant communities and the species dependent on them, including Forest Service sensitive species.

II. Description of Proposed Action

A. Weed Treatment Objectives and Priorities

The Proposed Action includes the use of aerial and ground-based herbicide applications plus mechanical, biological, controlled grazing, and combinations of these treatments to treat noxious weeds on the S-CNF. Treatment practices are described in *Section 2.C.1, Treatment Practices*. The overall management objective of the Proposed Action is to maximize the treatment of noxious and invasive weeds throughout the S-CNF using an Integrated Weed Management (IWM) approach as quickly as reasonably possible to protect the forest and its resources. This strategy is a holistic, *systems* approach to weed management. It involves the use of the best available management techniques to limit the impact and spread of the weed. IWM typically includes strategies for awareness and education, early detection and proactive prevention of noxious weeds, the use of all treatment "tools" such as mechanical, biological, controlled grazing, and chemical management practices, followed by restoration and revegetation (cultural) (as appropriate) and monitoring of weed-impacted lands. The anticipated types, mix, and extent of treatment practices and the management objective associated with the Proposed Action are presented in *Section 2.D, Alternatives Analyzed in Detail.*

Weed treatment objectives under the Proposed Action of an IWM approach include eradication (elimination), control (reducing the population over time), and containment (preventing the population from spreading). *Section 2.C.2, Treatment Objectives, Priorities, and Criteria* contains complete descriptions of each objective. Weed treatment priorities would be directed to where they have the greatest potential for removing or minimizing the adverse effects of weeds on other S-CNF resource values. Treatment priorities, in descending order, are as follows:

1) Eradicate new populations of aggressive weeds
2) Control existing populations of aggressive weeds
3) Contain existing populations of aggressive weeds
4) Eradicate new populations of less aggressive weeds
5) Control existing populations of less aggressive weeds
6) Contain existing populations of less aggressive weeds

Levels of S-CNF funding, staffing, and other resource availability would ultimately determine the schedule for addressing and implementing treatment priorities. If funding and staffing levels are inadequate for full implementation of the IWM program, treatment at a specific weed site may be deferred. This is defined as a "custodial" action as shown in *Section 2.C.2, Treatment Objectives, Priorities, and Criteria.*

B. Weed Treatment Practices

The Proposed Action includes a full array of weed treatment and non-treatment practices: restoring and revegetating (where appropriate) sites; developing monitoring programs to follow treatment; implementing a broad range of mitigating Best Management Practices (BMPs) and Standard Operating Procedures (SOPs); employing a site-specific minimum tool approach; and following an adaptive strategy in managing future weed infestations see *Section 2.C.1, Treatment Practices* for detailed descriptions. Options for weed treatment that would be considered for use on a site-specific basis under the Proposed Action include a variety of mechanical, biological, controlled grazing, chemical (ground-based and aerial applications of herbicides), and combinations of these treatments. A number of non-treatment practices, which are a cornerstone of IWM programs, also would be carried out under the Proposed Action. These practices include proactive weed prevention programs; weed inventory and early detection; information and education programs; cooperative partnerships and coordination; and compliance with laws, orders, policies, and Forest Plans. *Section 2.C.1, Types of Herbicides* and *Appendix J, Characteristics of Herbicides Discussed for Chemical Treatment Options in this Environmental Impact Statement* contain detailed descriptions of herbicides that could potentially be used on the S-CNF. *Appendix A, USDA Forest Service, Region 4 Best Management Practices for Weed Prevention and Management* and *Appendix C, Possible Treatment Methods Available, Life Cycle, and Mode of Reproduction for Known Established, New, and Potential Invaders of Weed Species on or Adjacent to the Salmon-Challis National Forest* include extensive lists of management practices and mitigation measures that would be implemented as an integral part of the Proposed Action to avoid or minimize the potential for adverse effects on S-CNF resources.

C. Restoration and Monitoring

Restoration and monitoring of treatment areas are integral components of the IWM program. Site restoration objectives include revegetating areas with desired vegetation where weeds have been eradicated, controlled, or contained; preventing future weed infestations; and slowing expansion of existing adjacent weed infestations (see *Section 2.C.3, Restoration and Monitoring* for detailed information).

D. Minimum Tool and Adaptive Strategy

Invasive weed treatments will incorporate the use of the "minimum tool" concept. During planning, S-CNF managers will select for use the minimum necessary option(s) to accomplish the weed management objectives at a specific site. If all treatment options are equally effective in controlling a particular species or infestation, the method with the least impact would be used (see *Section 2.C.5, Minimum Tool*). Parameters considered when selecting minimum tools include species biology, infestation size, proximity to water and recreation sites, and extent of sensitive habitats adjacent to infestations.

An adaptive weed management strategy would be employed to determine appropriate future actions to treat new populations of weeds, expansion of existing weed infestations, or weed infestations that have not yet been inventoried. The adaptive strategy would also cover any new weed species that occur on the S-CNF; any new federal-, state-, or county-designated species of noxious weeds; and any non-designated nuisance weeds present on

the S-CNF. This adaptive strategy provides a basis for covering future weed treatments on the S-CNF (see *Section 2.C.4, Adaptive Strategy*).

E. Weed Treatment Acres, Sites, and Management Goals

Table 2-6 in Chapter 2 of the EIS summarizes the acres of weed infestations on the S-CNF that would be treated annually under the Proposed Action using various available treatment options. A total of approximately 18,000 acres of weed infestations would be treated each year, with approximately 15,000 of these acres treated using herbicides. The expected time frames and goals for accomplishing the Proposed Action management objective would vary depending on the extent and severity of weed infestations. As discussed in *Section 2.D.2.b, Proposed Action—Aerial and Ground-Based Herbicide Application Plus Mechanical, Biological, Controlled Grazing, and Combinations of Treatments*, known acres of weed infestations are considerably greater on the North Fork and Salmon-Cobalt Ranger Districts (primarily spotted knapweed infestations) than on the other five S-CNF Ranger Districts and may require more time to achieve weed management goals. The following management goals are proposed for the S-CNF Ranger Districts:

- Eradicate all new starts (less than 5 acres in size) of aggressive weeds.
- Reduce established infestations of aggressive weeds 5 to 25 acres in size by 75 to 100 percent.
- Reduce established infestations of aggressive weeds greater than 25 acres in size by 50 percent.
- Eradicate all new starts (less than 5 acres in size) of less aggressive weeds.
- Reduce infestations of less aggressive weeds greater than 5 acres in size by 50 percent.
- Implement site restoration and revegetation actions (where appropriate) and monitoring programs following treatment to reduce or eliminate the subsequent reinvasion of weeds and to measure the degree of treatment success.
- Employ the minimum tool approach and an adaptive strategy using the site-specific implementation process.

The period of weed treatment under the Proposed Action would continue until a change in weed conditions on the S-CNF becomes evident, consistent with the proposed weed management goals. Future, presently undefined weed infestations would be treated using the adaptive strategy approach. For purposes of analysis, it has been assumed that full funding would be available for implementing the Proposed Action to work toward achieving those goals.

III. Sensitive Species Descriptions, Effects, and Conservation Measures

Descriptions of Forest Service sensitive species, potential effects of the Proposed Action on these species, and conservation measures that would be implemented to avoid or minimize adverse effects are presented in the following text under the headings *Plants* and *Wildlife and*

Fish. Forest Service Manual (FSM) 2670.5 defines sensitive species as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution." In FSM 2670.22, management direction for sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species (U.S. Forest Service 1990a).

A. Plants

1. Descriptions

Table L-1 lists the common and scientific names of Forest Service Region 4 sensitive plant species known or suspected to occur on the S-CNF.

TABLE L-1
Sensitive Plant Species on the S-CNF

Scientific Name	Common Name	Habitat Association
Agoseris lackschewitzii	pink agoseris	Wet meadows with soil saturated through the growing season.
Astragalus amnis-amissi	Lost River milkvetch	Cracks in ledges of similar sites on near vertical limestone cliffs, and in talus at base of cliffs; mostly in moist shaded areas.
Astragalus aquilonius [ES]	Lemhi milkvetch	Shale and gravel banks.
Astragalus diversifolius	meadow milkvetch	Moist often alkaline soil.
Astragalus paysonii [ES]	Payson's milkvetch	Burned and other open, disturbed sites between elevation 7,160 and 9,600 ft.
Astragalus vexilliflexus var. *nubilus*	White Cloud's milkvetch	Dry open ridges in White Cloud Range.
Carex incurviformis var. *incurviformis*	maritime sedge	Alpine and subalpine moist tundra and wet rock ledges. Elevation 10,000 to 12,200 ft.
Collomia debilis var. *camporum*	flexible alpine collomia	Talus slopes at high elevations.
Cymopterus douglassii	Douglass' wavewing	Alpine and subalpine areas on open slopes, ridges, and summits in calcareous or dolomitic substrates.
Cymopterus ibapensis	Ibapah wavewing	Rocky, high elevation sites in this region of Idaho. (Central mountains.)
Draba densifolia apiculata	rockcress draba	Moist, gravelly alpine meadows and talus slopes, often on limestone-derived soils.
Draba trichocarpa	Stanley whitlow-grass	Steep slopes on granitic parent material.

TABLE L-1
Sensitive Plant Species on the S-CNF

Scientific Name	Common Name	Habitat Association
Eriogonum capistratum var. *welshii*	Welsh's buckwheat	Rocky volcanic slopes and gravelly clay or sedimentary barren flats with minimal vegetation consisting of scattered sagebrush and grasses.
Eriogonum meledonum	guardian buckwheat	Unstable scree slopes on granitic parent materials.
Halimolobus perplexa var. *lemhiensis* [ES]	puzzling halimolobus	Granitic substrates in open ponderosa pine and Douglas-fir.
Haploppus insecticruris [ES]	bugleg goldenweed	Sagebrush and grass meadow areas around elevation 5,000 to 6,000 ft.
Mimulus clivicola	bank monkeyflower	Moist aspects of open mineral soil on south aspects.
Oxytropis besseyi var. *salmonensis*	Challis crazyweed	Sagebrush and salt desert shrub in sandy washes or open slopes of rocky volcanic soil.
Penstemon lemhiensis [ES]	Lemhi penstemon	Grassland and open ponderosa pine forests between elevation 6,300 and 7,200 ft.
Physaria didymocarpa var. *lyrata* [ES]	Salmon twin bladderpod	Rocky, sparsely vegetated, south slopes. Bare ground and rock coverage (1 to 3 inches rock).
Poa abbreviata ssp. Marshii [ES]	Marsh's bluegrass	Alpine fell-fields.
Primula alcalina	alkali primrose	Wet, alkaline meadows; level benches adjacent to creeks or springs; benches with hummocky topography, where they are found only on the tops and sides of the hummocks.
Thelypodium repandum	wavy-leaf thelypody	Moderate to steep, unstable, generally southerly facing slopes of rocky, gravelly to cindery substrate derived from Challis volcanic and metamorphic rock. Associated vegetation is sparse (5 to 20% cover), and bare ground coverage is high.
Thlaspi idahoense var. *aileeniae* [ES]	Stanley thlaspi	Rocky, sandy flats with sagebrush or river gravel.
Xanthoparmelia idahoensis [ES]	Idaho range lichen	Mountain rangelands of central Idaho in sagebrush.

[ES] = Species of early seral or disturbance regimes that are most likely to be negatively impacted by weed treatments.

Appendix H, Documented Occurrences of Sensitive Plants, Sensitive Wildlife, and Sensitive Fish by Ranger District and HUCs 4 and 5 on the Salmon-Challis National Forest of the EIS lists the occurrence of sensitive plant species on the S-CNF by Ranger District and Hydrologic Unit Codes (HUCs) 4 and 5. Twenty-five species listed in Table L-1 have been identified as sensitive by Forest Service Region 4 and are of special concern to the S-CNF, either because of known occurrences or known suitable habitat on the S-CNF. These species are as follows:

Pink Agoseris (*Agoseris lackschewitzii*). This species occurs in wet montane and subalpine meadows in the mountains of northwestern Wyoming, southwestern Montana, and adjacent Idaho. It flowers July to August. In Idaho, it has been found in Fremont and Lemhi Counties where it was growing either in open moist meadows with forbs, grasses, sedges, and rushes or in the ecotone between wet meadows and forests (Jankovsky-Jones 1999). When overstory trees are present they are usually subalpine fir, Engelmann spruce, whitebark pine (*Pinus albicaulis*), and Douglas-fir. Pink Agoseris is known to occur in Lemhi County in the Lemhi Range within the Mill Creek Basin. Associated species are tufted hairgrass, bistort (*Polygonum bistorta*), elephant's-head lousewort (*Pedicularis grounlandica*), and arrowleaf groundsel (*Senecio triangularis*) (NY Botanical Gardens Collection. Collected 1984. Specimen ID: 7047) (U.S. Forest Service 1990b).

Lost River milkvetch (*Astragalus amnis-amissi)*. This species is endemic to Custer and Butte Counties. It occurs on ledges and rock crevices of nearly vertical limestone cliffs and in talus at the base. It prefers moist, shaded microsites within these general habitats (NY Botanical Gardens Collection. Collected 1957. Specimen ID: 5308; U.S. Forest Service 1990b). This milkvetch blooms June to July.

Lemhi milkvetch (*Astragalus aquilonius)*. Lemhi milkvetch is endemic to east-central Idaho and occurs in Custer, Butte, and Lemhi Counties at lower elevations. It is found on unstable substrates, steep banks, sandy washes, and gullies within the shrub-steppe zone (U.S. Forest Service 1990a). This species blooms May to June.

Meadow milkvetch (*Astragalus diversifolius)*. This species is endemic to central Idaho and northern Utah with one historical report for the Green River Basin in western Wyoming. It occurs on moist, often alkaline meadows and in sagebrush valleys.

Payson's milkvetch (*Astragalus paysonii)*. Payson's milkvetch is a regional endemic known only from central and southeastern Idaho and southern Wyoming. This is a perennial species, which blooms July to August. It is a seral species that requires mineral soil (usually sandy soils with low cover of herbs and grasses) for establishment. These are the same conditions that generally favor weed invasion. Fire suppression (which is a factor in plant succession and canopy closure) may be decreasing the potential habitat for this species because it favors openings in stands of ponderosa pine, Douglas-fir, and sometimes lodgepole pine. All known locations of Payson's milkvetch are in disturbed areas, including recovering burns, clearcuts, trail edges, old skid trails, and road cuts.

After fires the potential for suitable habitat on the S-CNF for this species may increase. The characteristics of burn sites may give this species a higher potential for occurring in areas at risk from weed invasions.

White Cloud's milkvetch *(Astragalus vexilliflexus var. nubilus)*. This species is found in dry, open ridges in the White Cloud Range.

Maritime sedge (*Carex incurviformis* var. *incurviformis)*. This sedge occurs in alpine and subalpine zones on moist tundra and wet rock ledges. It is a circumpolar species that is known from high elevation areas in Canada and south to Colorado and California.

Flexible alpine collomia (*Collomia debilis* var. *camporum*). This species occurs on the North Fork of the Salmon River drainage in Idaho and in adjacent Montana. It inhabits stabilized talus slopes (Moseley 1992a).

Douglass' wavewing (*Cymopterus douglassii*). This plant is known from Custer County in Idaho on the Lost River Ranger District at high elevations over 9,000 feet. It occurs in alpine and subalpine zones on open slopes, ridges, and summits with calcareous or dolomitic substrates and blooms from mid-June to August (U.S. Forest Service 1990a). In high mountain cirque terrain it is found on sites that are level, gravelly, and with evidence of frost heaving (Moseley 1992b).

Ibapah wavewing (*Cymopterus ibapensis*). This species occurs in rocky, high-elevation sites in the central mountain region of Idaho.

Rockcress draba (*Draba densifolia apiculata*). This species occurs in moist, gravelly alpine meadows and on granitic talus slopes or rock crevices. This species usually prefers limestone-derived soils. It occurs at some high elevation sites in Wyoming, Utah, Montana, central Colorado, and Idaho.

Stanley whitlow-grass (*Draba trichocarpa*). This species is endemic to Idaho and all known populations are restricted to granite outcroppings surrounding the floor of the Stanley Basin in south-central Idaho. It is found in sagebrush/Idaho fescue (*Artemisia arbuscula* ssp. *thermopola/Festuca idahoensis*) habitat type variation with a mosaic that includes mountain big sagebrush (Moseley and Mancuso 1990). On a majority of sites, it was found growing with guardian buckwheat (see listing below). Both of these species were found on gentle ridgelines that are relatively stable and on steep rock outcrops and scree slopes (Moseley and Mancuso 1993).

Welsh's buckwheat (*Eriogonum capistratum* var. *welshii*). This species occupies rocky volcanic slopes. It is often associated with scattered sagebrush and grasses, usually at higher elevations.

Guardian buckwheat (*Eriogonum meledonum*). This species is endemic to Custer County in central Idaho. It occurs on unstable scree slopes on granitic parent materials (U.S. Forest Service 1990a).

Puzzling halimolobos (*Halimolobus perplexa* var. *lemhiensis*). This regional endemic occurs in central Idaho in Custer, Valley, and Lemhi Counties. Like Payson's milkvetch, it is a seral species requiring disturbance and bare soil to become established. It inhabits gravelly or sandy slopes, roadcuts, and dredge tailings with granitic substrates (U.S. Forest Service 1990a). It also occurs on grassy slopes adjacent to rock outcrops in open ponderosa pine and Douglas-fir forests (U.S. Forest Service 1999c). Many areas of potential habitat for puzzling halimolobos exist within the S-CNF with characteristics similar to those preferred by weeds.

Bugleg goldenweed (*Haploppus insecticruris*). Known distribution for this species is south-central Idaho in Camas and Elmore Counties. It inhabits sagebrush and grass meadows at 5,000 to 6,000 feet in elevation and blooms in July and August (U.S. Forest Service 1990a).

Bank monkeyflower (*Mimulus clivicola*). This plant is a regional endemic known from northern and west-central Idaho into northeastern Oregon. It is a small annual that produces a showy pink flower that blooms from late May through mid-July. The general

habitat is open ponderosa pine stands within mesic macroclimates (such as moist drainages). Specific habitat requirements are very restricted: southern aspects between 1,500 and 4,100 feet in elevation, in moist pockets of open mineral soil (such as a depressions in game trails) (Lorain 1993). There are no known occurrences on the S-CNF, but many areas of potential habitat. There is no way of knowing how much potential habitat meets the specific microsite requirements for this species.

Challis crazyweed (*Oxytropis besseyi* var. *salmonensis).* This is a species of sagebrush and salt desert shrub habitat. It occurs in sandy washes and open slopes with rocky volcanic soils where it blooms June through July (U.S. Forest Service 1990a).

Lemhi penstemon (*Penstemon lemhiensis).* This species is endemic to Lemhi County and adjacent counties in Montana. Its bright sky-blue flowers appear from June to July. This penstemon is an early seral species that requires bare soil to become established. It appears to be dependent on small-scale disturbances and has adapted to man-made disturbed sites, such as road cuts and fills and responds favorably after fire. It occurs in a variety of habitats, including dry grasslands, three-tipped sage/Idaho fescue and big sagebrush/needle-and-thread communities, mountain big sagebrush/bluebunch wheatgrass, open conifer ponderosa pine or Douglas-fir/grass lands, and ecotones between forest and shrub-steppe. It occurs at elevations from 3,200 to 8,100 feet (Moseley et al. 1990a, Moseley 1992a).

Since this species is widely adapted, there are many acres of apparently suitable habitat on the S-CNF. The characteristics of these potential sites give this species a high potential for occurring in areas that weeds also tend to prefer.

Salmon twin bladderpod (*Physaria didymocarpa* var. *lyrata).* This perennial mustard is endemic to Idaho. Until the 1980s, it was known only from one location on BLM land at Williams Creek in the Salmon River Mountains, then three new populations were found on private and BLM land (Hitchcock 1964, Steele 1977, Steele 1981, Steele 1983). In 1990, a specific search of the Salmon National Forest found no populations of Salmon twin bladderpod (Moseley et al. 1990b). Suitable habitat is believed to occur at lower elevations, just outside the S-CNF boundary, on drainages with headwaters in the S-CNF. All known populations are near the boundary of the S-CNF.

This species is found on scablands, shale banks, talus slopes, and gravelly soil (U.S. Forest Service 1990a). It grows on steep south-facing slopes between 4,050 and 6,800 feet in the big sagebrush/bluebunch wheatgrass zone. It has been found growing on loose, but stable, substrate along roadcuts and other disturbance sites. It is generally found on sites with little plant cover (Moseley et al. 1990b). These are the same site characteristics that weeds tend to prefer.

Marsh's bluegrass (*Poa abbreviata* ssp. *Marshii).* This dwarf grass is currently known from three states—Idaho, Nevada, and California. It grows on high alpine rocky slopes in scree and talus (Soreng 1991). These sites have short growing seasons and the possibility of heavy frosts at any time of the year. One known location in the Salmon River Basin of Idaho occurs within the Pahsimeroi Sub-basin.

Alkali primrose *(Primula alcalina).* This species is associated with wet, alkaline meadows; level benches adjacent to creeks or springs; and benches with hummocky topography, where they are found only on the tops and sides of the hummocks.

Wavy-leaf thelypody (*Thelypodium repandum*). This mustard is endemic to Custer County in central Idaho. It inhabits steep shale banks derived from volcanic and metamorphic rocks where it is associated with bunchgrasses and herbaceous perennials across a wide elevational range (4,900 to 7,000 feet). It blooms from May through September (U.S. Forest Service 1990a).

Stanley thlaspi (*Thlaspi idahoense* var. *aileeniae*). This mustard also is endemic to Custer County in central Idaho where it occurs on steep slopes on whitish sand among small rocks on sagebrush flats. It blooms from May to July (U.S. Forest Service 1990a).

Idaho range lichen (*Xanthoparmelia idahoensis*). Nothing more is known about this species than the information given in Table L-1.

2. Direct and Indirect Effects

Section 4.B.1, Vegetation Resources and Noxious Weeds, presents a detailed discussion of potential direct and indirect impacts on vegetation resources, including sensitive plants, on the S-CNF, resulting from the presence of noxious weeds and from the effects of treating noxious weeds. There are potential impacts to sensitive plant species within the S-CNF that occur in areas likely to be or that have already been invaded by noxious weeds. (See Table L-1 for those species that inhabit disturbed areas, early seral sites, or low moisture habitats.) Many of these sensitive plant species do not occur in areas with high potential for weed invasion, so treatment efforts would not impact those species. For those species that do occur in habitat with weeds, the use of either mechanical or chemical (herbicide) eradication methods for weed control may have detrimental impacts. Herbicides are not selective for specific forb species. All currently available herbicides that are capable of killing weeds can also kill sensitive plant species. Mechanical treatments that are focused on individual plants such as pulling or hoeing are less likely to harm sensitive plants, but mechanical treatments such as disking or plowing would be detrimental to sensitive plant populations.

The indirect effect with the most potentially detrimental outcome for sensitive plant species is not attempting or succeeding in efforts to curtail the spread of weeds on the S-CNF because the invasion of weeds compromises the integrity of native plant communities that support sensitive plants. The first impacts to sensitive plant species from not treating noxious weeds are likely to be to those species that inhabit disturbed areas, early seral sites, or low moisture habitats. The Proposed Action is designed to prevent this type of impact from occurring through the aggressive management and eradication, control, and containment of noxious weeds on the S-CNF.

Successful weed treatment may leave areas with little or no vegetation for a period of time. Foraging animals may move to other areas to find adequate forage, which could impact those areas with sensitive plant species to some degree. If livestock are moved from use areas where weed treatment is taking place onto use areas with sensitive plants, they may impact sensitive plants to a greater degree than normal.

3. Cumulative Effects

Cumulative effects on noxious weeds resulting from treatments under the Proposed Action together with coordinated weed management treatments on adjacent lands through the

three Cooperative Weed Management Areas (CWMAs) are likely to be highly beneficial to native plant communities and sensitive plants. This benefit should be a direct result of increased success at halting the exponential spread of noxious weeds on the S-CNF through their widespread eradication, containment, and control, together with continued success on adjacent lands. Under the Proposed Action, the spread of weeds on the S-CNF and perhaps on those non-National Forest lands immediately adjacent to the S-CNF would be expected to decline. Potential cumulative adverse effects on native plant communities and sensitive plants may result from other activities or occurrences on the S-CNF. These include the potential effects from increased grazing pressure on treated and untreated use areas. Potential disturbance and localized losses of native vegetation from heavy recreational use, the construction, maintenance, and use of roads and trails, wild fires, and logging could also decrease the ability of native vegetation and sensitive plants to overcome the effects of possible herbicide drift or mechanical weed treatments. The effects of other activities on the S-CNF can add to the cumulative effect on sensitive plants if these activities occur and impact the same populations of sensitive plants as weed treatment, especially within a brief time period.

4. Conservation Measures

Conservation measures for sensitive plant species will consist of all of the BMPs and mitigation measures described for the Proposed Action in Chapter 2 and *Appendix A, USDA Forest Service, Region 4 Best Management Practices for Weed Prevention and Management* of the EIS. All of these BMPs and mitigation measures will be implemented as an integral part of the Proposed Action to avoid or minimize the potential for adverse impacts on sensitive plants. Areas with potential populations of sensitive species will be assessed prior to weed treatment. If necessary, surveys will be performed to locate populations of sensitive plants and hand weed removal or herbicide buffers will be implemented to clear weeds from those sites. Sensitive populations will be buffered from herbicide spraying by a no spray zone recommended by the manufacturer and/or by the Forest Service. If needed and appropriate, the treatment site will be reseeded to native vegetation once weeds are eradicated. If possible, sensitive plant species may be used in the seeding mix. These and other examples of BMPs and mitigation measures for vegetation resources and sensitive plants were summarized in *Section 4.B.1, Vegetation Resources and Noxious Weeds* of the EIS as follows: all aerial treatment areas will be assessed or field surveyed for sensitive plants prior to initial spraying; a 300-foot buffer zone flagged, mapped, and reviewed with the pilot will be maintained around sensitive plant populations for aerial herbicide applications; revegetation of any site within the treatment area with substantial soil disturbance or with inadequate native vegetation onsite to naturally reseed the area; equipment will be cleaned before entering S-CNF sites and before leaving weed treatment sites; no chemical will be applied directly to sensitive plant species during spot treatments and a 100-foot buffer will be maintained around known sensitive plant populations during broadcast treatments; and all weeds that are mechanically or hand excavated after flower bud stage will be bagged and properly disposed. In addition, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which are described in Chapter 2 of the EIS. These management tools are designed to consider site-specific resource conditions, including sensitive plant species, that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources.

B. Wildlife and Fish

1. Descriptions

The S-CNF project area contains suitable habitat for 13 current and 3 proposed Forest Service Region 4 sensitive wildlife and fish species. Table L-2 lists the common and scientific names of these species, together with their state and Forest Service protected status. They are represented by 4 mammal, 9 bird, 2 fish, and 1 amphibian species. Habitat requirements and existing environments on the S-CNF for these species are described in the following text.

TABLE L-2
Sensitive Wildlife and Fish Species on the S-CNF

Scientific Name	Common Name	State Status	USFS Region 4 Status	Notes
Mammals				
Corynorhinus townsendii	Townsend's big-eared bat	S2	S	
Euderma maculatum	spotted bat	S2	S	
Martes pennanti	fisher	S1	S	
Gulo gulo	wolverine	S2	S	
Birds				
Accipiter gentilis	Northern goshawk		S	
Aegolius funereus	boreal owl	S2	S	
Falco peregrinus anatum	American peregrine falcon	S2	S	Delisted, monitoring recommended.
Falco columbarius	merlin	S2N	PS	
Histrionicus histrionicus	harlequin duck		S	
Otus flammeolus	flammulated owl		S	
Picoides tridactylus	three-toed woodpecker	S2	S	
Sitta pygmaea	pygmy nuthatch	S3	PS	
Stix nebulosa	great gray owl		S	
Fish				
Oncorhynchus clarki lewisi	*westslope cutthroat trout*	S2	S	
Acipenser transmontanus	white sturgeon	S1	PS	

TABLE L-2
Sensitive Wildlife and Fish Species on the S-CNF

Scientific Name	Common Name	State Status	USFS Region 4 Status	Notes
Amphibians				
Rana luteiventris	Columbia spotted frog		S	

a. Mammals

Townsend's Big-eared Bat. This bat inhabits a variety of habitats from desert shrub to deciduous and coniferous forests at a wide range of elevations. In Idaho, some individuals likely migrate to hibernal sites to overwinter and disperse to forested areas during summer when the sexes separate (Pierson et al. 1999). Other individuals found near Lake Pend Oreille seem to use the same mine during both summer and winter. In Lemhi County, this species has been captured in numerous mist net and harp trap surveys of abandoned mine adits. Hollow cavities in large trees or snags may constitute an important undocumented resource for maternity colonies of this species. Their diet consists mainly of moths in the family Noctuidae with lesser amounts of beetles, flies, and other insects.

Spotted Bat. The spotted bat is very uncommon in central Idaho, but is distributed across a wide range of habitats in the western mountain region from desert scrub to open ponderosa pine forests. This species usually occurs in rough, rocky, semi-arid to arid landscapes and roosts in cliff faces and rock crevices (Genter and Jurist 1995). This species is solitary in nature, and the female bears one young each year in late spring. Its diet consists almost exclusively of medium-sized moths, beetles, and caddisflies. Foraging has been observed in forest openings, particularly ponderosa pine forests, pinyon juniper woodlands, large riverine/riparian habitats, riparian habitat associated with small to mid-sized streams in narrow canyons, wetlands, meadows, and old agricultural fields. In Idaho, populations occur in the central and southwestern corner of the state (Doering and Keller 1998). One unvouchered record for the Salmon River in Nez Perce County exists, and a juvenile was caught and released during a mist net survey in the Middle East Fork of the Salmon River in 1998. Two vouchered specimens have been collected in Idaho; the remaining records are from acoustic recordings.

Fisher. In the Pacific Northwest, the distribution of this species coincides with the habitat occupied by snowshoe hares, especially Douglas-fir forests. Fishers are generalized predators that eat a wide variety of birds, mammals, fruit, and carrion. The fisher is known as a predator of porcupines, but snowshoe hares are the most common prey (Ingles 1965, Powell and Zielinski 1994). Fishers avoid non-forested areas, especially in winter (Coulter 1966, Earle 1978, Jones 1991, Jones and Garton 1994, Kelly 1977). In the S-CNF, this species has been noted in the Pistol Lake area and the North Fork of the Salmon River drainage.

Wolverine. This rare mammal is distributed circumpolarly from the 38th parallel north, with populations in the Colorado Rocky Mountains and California Sierra Nevada dropping below this latitude (Banci 1994). This species feeds on small animals, snowshoe hare,

porcupines, and marmots, as well as on carrion. They are found in inaccessible areas of mountain ranges in central Idaho and are believed to be distributed mainly in the Selkirk Mountains and the Sawtooth Mountain-Smokey Mountain complex (Groves 1988), but are also known to occur in the Salmon River Mountains and the Beaverhead Mountains.

b. Birds

Northern Goshawk. This accipiter is a forest habitat generalist that uses a variety of forest types, ages, structural conditions, and successional stages. It feeds on birds and small mammals (Johnsgard 1990, Reynolds et al. 1992). During nesting, goshawks select mature forest consisting of a combination of old, tall trees with intermediate canopy coverage and small open areas within the forest for foraging. This species occurs in many areas on the S-CNF, such as the Salmon River Mountains and the Lemhi Mountains.

Boreal Owl. This owl inhabits spruce-fir forests in Montana, Idaho, and northern Wyoming (Hayward et al. 1993). They require cavities for nesting and feed primarily on small mammals, especially southern red-backed voles (*Clethrionomys gapperi*). Spruce-fir is the preferred species but cavities have been found in Douglas-fir, lodgepole, aspen, and high elevation ponderosa pine (Hayward and Verner 1994). Boreal owls inhabit mature and older forest stands and need forest management and timber harvest systems that will retain snags and forest structure. Boreal owls are present within the North Fork and Salmon/Cobalt Ranger Districts.

Peregrine Falcon. Populations of this bird were considered to have sufficiently recovered so that the USFWS removed it from the Endangered Species List on August 20, 1999. This falcon feeds on a variety of smaller birds often associated with riparian habitats that are usually captured on-the-wing. This species nests mainly on cliffs, rarely in trees, and usually near water. Breeding peregrine falcons are most likely to be disturbed by activities taking place near their nest (Herbert and Herbert 1969, Ellis 1982). This species is known to nest in Lemhi County but not on the S-CNF.

Merlin. This falcon summers in a variety of habitats, including forest edges, farmland, and urban areas. It winters on coastal lowlands, prairies, and marshes. For nesting, it uses abandoned nests from other birds, a cavity in a tree or cliff, or even on the ground. The merlin preys mainly on small birds of the ground and low vegetation (such as larks, swallows, finches) small mammals, lizards, snakes, and insects (Stokes and Stokes 1996).

Harlequin Duck. This sea duck, which winters along both coasts, breeds along inland streams. On the West coast, this species breeds and summers inland from the coastal mountains of Alaska to California, and along the northern Rocky Mountains to Yellowstone (Bellrose 1980). This riparian species prefers stretches of streams with mature and old growth forests. Aquatic insect larvae are the preferred diet for juveniles and for adults during the breeding season (Cassirer and Groves 1994). In Idaho, nest sites include cavities in trees and cliff faces (Cassirer et al. 1993). Adult females show fidelity to nest sites, but radio-tagged harlequins have used new nest sites after a nest failure the previous year (Cassirer et al. 1993, Wallen and Groves 1989). This species is only known to occur on the S-CNF during seasonal migrations.

Flammulated Owl. This tiny, insectivorous owl is a neotropical migrant that breeds in the mountains of the western U.S. and winters in the Southwest U.S., Mexico, and Central

America. Summer breeding sites are mainly in ponderosa pine and Jeffrey pine (*Pinus jeffreyi*) (Verner 1994). Preferred nesting sites are in forests with old ponderosa pine mixed with Douglas-fir (Linkhart et al. 1995). This owl is known to breed in several areas on the S-CNF in mature ponderosa pine and Douglas-fir forest.

Three-toed Woodpecker. This rare woodpecker eats predominantly insects. Approximately 75 percent of its diet is insects such as wood-boring beetles, grubs, weevils, ants, other beetles, and spiders. Besides insects, it also feeds on berries and other small fruits, acorns, and nuts (Stokes and Stokes 1996). It often forages on fire-killed trees for insects (Hutto 1995). Post-fire conditions are important to this species for both feeding and nesting purposes. This species is known to utilize burned areas across the S-CNF.

Pygmy Nuthatch. This bird is a year-long inhabitant of ponderosa pine forests from low to high elevations (10,000 feet). They will also use other species of pine. Pygmy nuthatches forage on branches, outermost twigs, pine cones, and tree trunks for wasps, ants, spittle insects, beetles, moths, caterpillars, grasshoppers, spiders, and pine seeds. This nuthatch usually excavates its own nest cavity in pine, but occasionally will use abandoned woodpecker holes (Stokes and Stokes 1996).

Great Gray Owl. This owl builds open nests in large trees in heavy forest canopy (Bull and Henjum 1990). They forage in more open forest sites with heavy grass ground cover, where they perch in snags or live trees to hunt. They prey upon relatively small prey, mostly small rodents such as voles (Microtus spp.) (Duncan and Hayward 1994). This owl has been found at higher elevations throughout the S-CNF.

c. Fish

Westslope Cutthroat Trout. Westslope cutthroat trout is listed as a sensitive species by the Forest Service and as a priority species of special concern by the State of Idaho because of habitat degradation and declines of genetically pure populations (IDFG 2001). This species is widely distributed throughout the S-CNF (see *Appendix H, Documented Occurrences of Plants, Sensitive Wildlife, Sensitive Fish by Ranger District and HUCs 4 and 5 on the Salmon-Challis National Forest* of the EIS for distribution information by Ranger District and HUCs 4 and 5). However, like bull trout, it is largely dependent on high-quality habitat for survival, including cold water, numerous deep pools, and stream beds that are relatively free of sediment (Quigley and Arbelbide 1997). The strongest populations of Westslope cutthroat trout occur in watersheds less influenced by roads or land management practices. Stocked non-native species of cutthroat and rainbow trout can also adversely affect Westslope cutthroat trout by hybridization. Migratory populations of this species are most significantly affected by the loss of viable habitat (Quigley and Arbelbide 1997).

White Sturgeon. The Snake River population of this species (*Acipenser transmontanus*) has been identified by the USFWS and the State of Idaho as a species of concern. This species is proposed for sensitive status by the Forest Service in Region 4. It has been adversely affected by hydropower projects through migration barriers and population fragmentation (Quigley and Arbelbide 1997) and by overfishing (IDFG 2001). The Snake River population of white sturgeon occurs in the Snake River and in the mainstem Salmon River upstream to Clayton. This large, long-lived, bottom-oriented species is associated with large cool rivers (Simpson and Wallace 1978). It spawns in late spring/early summer over a rocky bottom in swift current near rapids. White sturgeon may not reach sexual maturity and spawn until 10 to

15 years of age. The largest sturgeon recorded from Idaho was a 1,500-pound fish caught in 1898 on a set line in the Snake River near Weiser (Simpson and Wallace 1978).

d. Amphibians

Columbia Spotted Frog. The Columbia spotted frog (*Rana luteiventris/R. pretiosa*) is a Forest Service sensitive species. It is highly aquatic and lives in or near permanent bodies of water, including lakes, ponds, slow streams, and marshes. It prefers areas with thick algae and sparse emergent vegetation, but sometimes hides under decaying vegetation. This frog is usually found in non-woody wetland habitats (sedges, rushes, and grasses). In the northern part of its range where snow and ice accumulate, spotted frogs are inactive during the winter and most hibernate and aestivate. The Columbia subspecies of the spotted frog is distributed over a wide range of altitudes, and in Washington has been found from approximately 1,700 to 3,100 feet above sea level (Leonard et al. 1993). There are many known occurrences of this species on the S-CNF (see *Appendix H, Documented Occurrences of Plants, Sensitive Wildlife, Sensitive Fish by Ranger District and HUCs 4 and 5 on the Salmon-Challis National Forest*).

2. Direct and Indirect Effects

Section 4.B.2, Aquatic Resources and *Section 4.B.3, Wildlife Resources*, of the EIS present detailed discussions of potential direct and indirect impacts on aquatic and wildlife resources, including sensitive fish and wildlife species on the S-CNF resulting from the presence of noxious weeds and from the effects of treating noxious weeds. Results are presented in the following text.

a. Wildlife

The description of wildlife source habitats and associated species in *Section 3.C.3, Wildlife Resources*, in Chapter 3 of the EIS and the analysis of potential impacts on these species' habitat in *Section 4.B.3, Wildlife Resources* covered all of the sensitive mammal, bird, and amphibian species listed in Table L-2. The impact analysis for the Proposed Action concluded that wildlife habitat effects include loss and degradation of habitat quality or quantity due to current and potential future weed infestation on the S-CNF and, to a lesser extent, increased fire risk. Habitat effects would occur over a long term and reflect the projected rate of weed spread on the S-CNF and the expected success of weed treatment under the Proposed Action. Disturbance effects include displacement of wildlife because of increased human activity during weed treatment and land rehabilitation and would be of short-term duration. Disturbance threats are directly related to the anticipated levels of human activity and the varying sensitivity of different wildlife species to human disturbance. The wildlife analysis concluded that the long-term benefits to all of the wildlife source habitats and sensitive wildlife species on the S-CNF from implementing the Proposed Action would be high. Other potential effects such as wildlife mortality from herbicide ingestion have been determined to be insignificant (see discussion under the Proposed Action in *Section 4.B.3, Wildlife Resources* of the EIS).

There are reports that some synthetic chemicals (such as DDT and some pesticides) released into the environment may disrupt normal endocrine function in a variety of wildlife, altering physiological and behavioral function (U.S. EPA 1997). It is unknown whether herbicides that mimic plant growth hormones have this effect on wildlife and their endocrine systems, primarily because information is not available (Safe et al. 2000). In

addition, many other factors disturb growth, reproduction, and survival. Wildlife can be subject to a number of different stressors (such as habitat loss, competition, food availability, and disease) that may affect the same endocrine markers used to evaluate the effect of endocrine disrupters (Safe et al. 2002; WHO 2002). Thus, the relationship between adverse hormonal effects in wildlife and endocrine disruption remains speculative (WHO 2002).

b. Fish

The potential for adverse direct and indirect effects on aquatic and riparian habitat and sensitive species resulting from noxious weeds on the S-CNF would progressively decline under the Proposed Action. The Proposed Action includes a blend of weed treatment methods designed to aggressively eradicate, control, and contain weed species on the S-CNF and to reclaim disturbed areas where appropriate following treatment. The likelihood of increased erosion, surface runoff, and sediment delivery to drainages, possibly resulting in riparian and instream habitat degradation and impacts to sensitive aquatic resources, would decline as weed-infested areas are treated and reclaimed. This would result in improved aquatic and riparian habitat conditions and reduced threats to all aquatic species on the S-CNF compared to existing conditions. Benefits may be greatest in the northern portion of the S-CNF where substantial reductions in spotted knapweed infestations could potentially benefit aquatic habitat and numerous aquatic species. Benefits would be especially important to salmonids with narrow habitat requirements of clean, cold, connected, and well-oxygenated water with complex habitat, such as westslope cutthroat trout as well as the federally listed bull trout, and the Snake River steelhead, spring/summer chinook salmon, and sockeye salmon. Benefits from the Proposed Action could contribute to the recovery and well-being of these sensitive and protected fish species. Riparian benefits expected under the Proposed Action would be especially important to amphibians such as the Columbia spotted frog, western toad, and long-toed salamander.

Four worst-case situations involving the use of herbicides to treat weeds on the S-CNF and the potential effects on aquatic resources are analyzed in *Section 4.B.2, Aquatic Resources*, of the EIS. The analyses include the inadvertent entry of herbicides into aquatic ecosystems through surface runoff (six worst-case scenarios are examined), leaching through soils, accidental spills, and wind drift. These four situations are generally regarded as worst-case examples because of the extensive list of BMPs and mitigation measures described in Chapter 2 of the EIS that would be implemented as integral parts of the Proposed Action to avoid or minimize the potential for worst-case adverse effects to occur. Results of those analyses indicate that it is unlikely that any of the worst-case situations analyzed, including the northern S-CNF where some weed infestations are severe and the central and southern S-CNF where weed infestations are much less extensive, would occur because of the implementation of BMPs and mitigation measures, and use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy. If worst-case conditions did occur, the scenarios involving herbicide runoff and leaching of herbicides would not be expected to result in adverse impacts on populations of aquatic resources, including fish, invertebrates, and amphibians. Potential short-term impacts on aquatic and riparian resources could occur if there was an accidental spill of a relatively toxic herbicide in a small drainage. Resultant effects may be localized depending on various factors, including the volume of spill and dilution by the receiving water. Adherence to BMPs and mitigation measures would reduce the likelihood of such a spill occurring, plus they would

minimize or avoid the potential occurrence of wind-drift-related impacts on aquatic resources and amphibians.

3. Cumulative Effects

a. Wildlife

Cumulative effects of weed treatments under the Proposed Action combined with treatment effects of the three CWMAs would result in long-term benefits to sensitive wildlife species because of greater levels of weed control and eradication, slower weed population spread, and less total weed-infested acreage compared to existing conditions. This would result in cumulatively improved habitat conditions for sensitive wildlife on and off the S-CNF. New weeds that have invaded the S-CNF from adjacent lands would likely be eradicated, and invasion of adjacent lands by weeds presently occurring on the S-CNF would be curtailed as weed populations are controlled or eradicated. This cumulative effect would beneficially affect sensitive wildlife and their habitat both on and off the S-CNF. Beneficial cumulative effects on sensitive wildlife and their habitat may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of opportunities for the eradication and control of extensive spotted knapweed infestations. There would be some cumulative disturbance of wildlife from the combined effects of weed treatment and other ongoing S-CNF activities, such as recreation, especially in heavily roaded areas.

b. Fish

Cumulative effects on noxious weeds resulting from treatments under the Proposed Action combined with treatments under the three CWMAs would result in benefits to aquatic habitat and resources compared to existing conditions through the widespread eradication, control, and containment of noxious weeds. The CWMAs and the S-CNF weed management program would cumulatively be expected to result in increased levels of weed treatment success. Under the Proposed Action, weed infestation on the S-CNF would progressively decline. This would reflect the eradication, control, and/or containment of new weeds that have invaded the S-CNF from adjacent lands covered by the CWMAs, and increased success in preventing weeds presently occurring on the S-CNF from invading adjacent lands. This particular benefit may directly contribute to a decline of weeds on adjacent non-National Forest land.

This cumulative effect could potentially benefit aquatic and riparian habitat and a range of protected and sensitive species through reduced erosion and sediment delivery to drainages. Beneficial cumulative effects on aquatic resources may be greatest in the northern portion of the S-CNF and on adjacent non-National Forest lands because of extensive spotted knapweed infestations that would be aggressively managed. No adverse downstream cumulative effects on non-National Forest land would be expected from worst-case situations involving herbicide runoff or leaching because of the extremely low concentrations. There is the potential for downstream adverse effects on aquatic and riparian resources and sensitive species if a herbicide spill or wind-drift-related impact occurred close to Forest Service boundaries. Increased flows proceeding downstream would further dilute the herbicide. Weed management BMPs and mitigation measures described previously are designed to prevent these types of impacts from occurring.

Additional cumulative effects on aquatic resources associated with other ongoing activities on the S-CNF would occur under the Proposed Action. These cumulative effects include the

potential for erosion and sediment delivery from road and trail-related construction and maintenance activities, livestock grazing along drainages, and recreational activities adjacent to drainages. Also, cumulative effects on aquatic resources from weed treatment activities under the Proposed Action potentially include short-term increases in erosion and sediment delivery to drainages caused by more extensive mechanical treatments (soil disturbance) and chemical treatments (creation of barren ground from weed removal) than under existing conditions. These areas would be subject to erosion until native vegetation becomes re-established, after which time erosion and sediment delivery should be less than when weeds were present and provide correspondingly greater benefits than under the No Action Alternative. This would represent an overall long-term cumulative benefit to aquatic habitat and resources. Finally, there is the possibility of herbicide application in adjacent areas (S-CNF and CWMA) and possible cumulative effects on aquatic resources. However, the CWMA efforts are coordinated with the management agencies to avoid multiple treatments within a defined geologic location. In addition, all such applications would be in accordance with EPA label guidelines, which are designed to protect aquatic organisms.

The Forest Service (2001d) discussed the potential for two additional types of cumulative effects on aquatic organisms in northern Idaho from herbicide application. These are the potential for the bioconcentration of herbicides in aquatic organisms and the possibility of synergistic, combined effects on aquatic organisms when several herbicides are present. For bioconcentration to occur, a pollutant must be present in a high concentration for an extended period of time, the organism must be exposed to the pollutant, and the pollutant must have a high resistance to breakdown or excretion by the organism to allow a sufficient uptake period that would result in an elevated bioconcentration. The Forest Service (2001a) concluded that the risk of bioconcentration would be low because of the relatively small amount and timing of herbicide application. The risk of herbicide bioconcentration in aquatic organisms on the S-CNF also would be expected to be low because of the extremely low concentrations of herbicides that aquatic organisms would be briefly exposed to during even a worst-case situation. In addition, the herbicides that could be used to treat spotted knapweed on the S-CNF do not bioaccumulate in fish and/or have very little persistence in the environment (Information Ventures, Inc. 2002).

The Forest Service (2001a) concluded that no synergistic effects from herbicide application would occur. This was because: 1) the EPA currently supports an additive model in predicting synergistic effects, 2) relatively small amounts of herbicides would be applied, and 3) where more than one herbicide is applied the amount of each chemical applied would typically be reduced. This same rationale and conclusion regarding the potential for synergistic effects on aquatic resources also applies to the S-CNF. In addition, because the chances of multiple different herbicide activities taking place in the same drainage on the same day are unlikely, the potential for cumulative synergistic effects on aquatic organisms, including sensitive species, on the S-CNF would be minimal.

4. Conservation Measures

Conservation measures for sensitive wildlife and fish species will consist of all of the BMPs and mitigation measures described for the Proposed Action in Chapter 2 and *Appendix A, USDA Forest Service, Region 4 Best Management Practices for Weed Prevention and Management* of the EIS, the same as described for sensitive plants. A total of 52 management practices and mitigation measures address weed prevention and management BMPs and the proper

application of herbicides, including 20 measures specifically directed at the proper aerial application of herbicides. All of these BMPs and mitigation measures will be implemented as an integral part of the Proposed Action to avoid or minimize the potential for adverse impacts on sensitive plants. Many of the same examples of BMPs and mitigation measures that were described for sensitive plants also serve to protect sensitive wildlife and fish. Examples include compliance with all State and Federal laws and agency guidelines during herbicide application; application of herbicides in accordance with EPA registration label requirements and restrictions; use of a 50-foot no spray buffer zone for broadcast or "block" applications and use of a 15-foot buffer for spot applications along all flowing water streams and ponded water bodies (reduced buffer zones will be considered when using label-approved aquatic formulations [e.g., aquatic 2,4-D]); no spraying of herbicides when wind velocity exceeds 10 mph, or within 50 feet of open water when wind velocity exceeds 5 mph; use of label-approved aquatic formulations near open water; and BMPs and mitigation measures described in the preceding discussions in this section regarding accidental spills of herbicides and wind drift during aerial application. This includes a 300-foot no-treatment buffer zone on all fish-bearing streams, lakes, and ponds and a 100-foot no-treatment buffer zone on non-fish-bearing waters during aerial herbicide application. A BMP specifically directed at wildlife is the use of weed-specific herbicides on big game winter range to minimize impacts to winter forage. In addition to these measures, the Proposed Action incorporates use of a site-specific implementation process, decision tree, a minimum tool approach, and an adaptive strategy, which were described in Chapter 2. These management tools are designed to consider site-specific resource conditions that result in the selection of a treatment method that achieves weed management goals with the least impact to S-CNF resources, including sensitive wildlife and fish species.

IV. Determinations

Based on the foregoing analyses of potential effects of the Proposed Action on sensitive plants, wildlife, and fish occurring on the S-CNF and supporting information contained in the EIS, and assuming implementation of all BMPs and mitigation measures described in Chapter 2 and *Appendix A, USDA Forest Service, Region 4 Best Management Practices for Weed Prevention and Management* of the EIS as an integral part of the Proposed Action, it is determined that the Proposed Action results in a determination of **No Impact** or **May Impact Individuals or Habitat, But Not Likely to Lead to a Trend Toward Federal Listing or Reduced Viability for the Species** for sensitive plants, wildlife, and fish on the S-CNF. The determinations of No Impact and Not Likely to Lead to Listing are the same determinations that were described for westslope cutthroat trout in two BAs/BEs prepared by the Forest Service for non-chemical and chemical treatment of noxious weeds on the S-CNF during the year 2002. Implementation of the Proposed Action is expected to have an overall, long-term beneficial effect on sensitive plants, wildlife, and fish on the S-CNF.

Appendix M

Responses to Public Comments on the Salmon-Challis National Forest Noxious Weed Management Program Environmental Impact Statement

APPENDIX M

Responses to Public Comments on the Salmon-Challis National Forest Noxious Weed Management Program Draft Environmental Impact Statement

TABLE M-1
Draft EIS Comment Letters

Reference Number	Source of Letter
1	Idaho State Department of Agriculture
2	Committee for the High Desert
3	Idaho Department of Parks and Recreation
4	Joe Tonsmeir
5	Formation Capital Corporation, US
6	Lemhi County Weed Superintendent
7	U. S. Department of the Interior
8	Rodger L. Sorensen
9	The Ecology Center, Inc.
10	Custer County Board of Commissioners
11	National Oceanic and Atmospheric Administration
12	Friends of the Bitterroot
13	U.S. Environmental Protection Agency

THIS PAGE INTENTIONALLY LEFT BLANK

Comment Letter No. 1

----- Forwarded by William B Diage/R4/USDAFS on 12/27/2002 11:42 AM -----

"Glen Secrist" <GSECRIST@agri.state.id.us>

12/27/2002 09:04 AM

To: <wdiage@fs.fed.us>
cc:
Subject: S-C NF Weed Management Program Draft EIS

We have reviewed the Salmon-Challis National Forest Weed Management Program Draft EIS and have the follwing comments:

1.1 1. We have found the draft EIS to be comprehensive, well-written and consistent with the best weed management science available. 2. The Idaho State Department of Agriculture supports implementation of the proposed action as outlined in the draft EIS.

Glen Secrist
Bureau Chief
Vegetation Management
Idaho State Department of Agriculture
2270 Old Penitentiary Road
P.O. Box 7249
Boise, ID 83707
(208)332-8536 FX: (208)334-4062

1

Page 1 of 1

1.1 Your comment in support of the Proposed Action is noted.

COMMITTEE FOR THE
HIGH DESERT
P.O. BOX 2863 BOISE, IDAHO 83701
208-429-1679 www.highdeserts.org

December 21, 2002

William Diage
Salmon-Challis National Forest
50 Highway 93 South
Salmon, ID 83647

Dear Forest,

Here are comments of the Committee for the High Desert and Western Watersheds Project on the Salmon-Challis National Forest Weed Management Program.

First, we incorporate all comments and issues raised in our scoping comments on this EIS.

2.1 We are very disappointed to see that the Forest has overwhelmingly focused on active treatment methods, and failed to consider passive treatments. The Forest has also failed to address causal factors. Weeds are proliferating in the heart of vital wildlife habitats in these lands of great scenic beauty, yet you steadfastly refuse to assess management changes necessary to stem the tide of invasive species.

Your purpose and need states that you are to "protect the natural condition and biodiversity of ecosystems, and watershed function by preventing and/or limiting the introduction and subsequent spread of invasive, non-native plants that displace native vegetation", "contain and reduce known and potential weed sources, protect sensitive and unique habitats", etc.

2.2 Yet instead of focusing on fundamental common sense practices – such as limiting, reducing or eliminating disturbance caused by livestock and/or roads, you embark on an entire EIS that ignores the primary causes of new and expanding weed infestations.

The primary variation between the 3 action alternatives that you analyze relates to use of herbicide, and your preferred alternative maximizes extent of herbicide use through ALL methods of application, including aerial application.

100% Recycled

2.1 Each alternative considers a full spectrum of weed prevention and management strategies including Integrated Weed Management (IWM), Best Management Practices (BMPs), public awareness, and education, as discussed in Section 1.A.1 of the Final Environmental Impact Statement (FEIS). All of these important practices are being actively implemented and will remain in place. An alternative addressing Forest management and use allocation changes was considered, but was dismissed based on the detailed analysis in Section 2.E of the FEIS.

2.2 See Response 2.1.

All action alternatives include treating 18,000 acres, with various deviations in acres treated by mechanical, biological, "controlled grazing" and combinations thereof.

2.3 We are very concerned about the potential effects of the preferred alternative and the Forest's myopic view of focusing on active "treatment" without addressing causes of the weed explosion. This will have serious harmful long-term effects on wildlife habitat, fisheries, native plant communities, soil erosion, TES species, vegetation diversity, ecosystem function, watershed integrity, and recreational and aesthetic uses of the affected lands.

2.4 Harmful direct and indirect effects on wildlife species and their habitats from ground and aerial applications of herbicides are largely unaddressed.

Given that you acknowledge (2-28) that there are already 66,537 acres of inventoried weed infestations at 2,724 sites on the Forest, what possible reason can you have for not taking active preventive and restoration measures to stop this explosion of weeds?

2.5 We have included (Attachment A) the basic components of an alternative that would best allow you to grapple with invasive species on the Forest. We request that you include this alternative in a Supplemental DEIS.

2.6 You can not tier this document to the old Salmon and Challis Forest Plans. They were done in 1987, and are woefully out-dated. They do not reflect current scientific understanding of ecological processes and the habitat needs of rare, declining and TES species, nor do they reflect the harm done by activities like livestock grazing to watersheds throughout the Forest lands covered in the DEIS. TES species inhabiting the Forest include lynx, bull trout, chinook salmon, and steelhead trout, and gray wolf.

For example, the Forest Plan amendment for livestock grazing allows extreme levels of livestock use – utilization levels to 65% on "late/good" condition upland communities. This is a ticket for livestock degradation and disturbance levels that create the ideal conditions for invasion and proliferation of weeds throughout fragile native vegetation communities in uplands. Livestock degradation of soils and plants in uplands causes increased sedimentation to streams.

2.7 Plus, there is no current analysis of suitability or carrying capacity for the affected lands. As part of the DEIS process, you must prepare a current analysis, and determine whether lands "at risk" to new weed infestations, lands seriously infested with weeds (the northern part of the Forest), lands with streams that provide habitat for ESA-listed fish, and lands with other important values, are really "suitable" for livestock grazing.

2.3 See Response 2.1. A complete analysis of the long-term effects of the Proposed Action, and each of the alternatives, on all resources has been completed. Each resource is addressed individually in Chapter 4 of the FEIS.

2.4 Direct, indirect, and cumulative effects on wildlife, including the safeguards associated with mitigation measures, BMPs, and SOPs, are addressed in Section 4.B.3.

2.5 We considered Attachment A, and the approaches for preventive weed management, and note that parts of your proposal within the scope of this FEIS have been incorporated as part of the alternatives analysis and selection. Those elements of Attachment A that go beyond the scope of this FEIS are considered in Section 2.E.

2.6 This Weed Management FEIS is an independent analysis of weed management activities and is not tiered to the analyses presented in the two Forest Plan EISs nor to the Salmon or Challis Land and Resource Management Plans. Some historical information was obtained from these earlier documents and compared with current conditions in order to evaluate the Proposed Action and alternatives.

2.7 This FEIS is not a livestock grazing analysis. Analyzing livestock grazing suitability and carrying capacity is beyond the scope of this FEIS. See also Response 2.1.

The old Forest Plans contain no site-specific assessment of the impacts of livestock grazing. As a lawsuit we recently in federal district court demonstrates, many ecologically important and sensitive areas of the Forest are seriously degraded through management (and woeful lack of any modern day management) of livestock. The Forest has utterly failed to comply with the Rescissions Act schedule for completing environmental analyses for livestock grazing throughout the Forest. It has failed to comply with NEPA and excluded the public in making decisions about livestock grazing, and has relied on long-outdated AMPs (some from the 1940s). In some cases, there are no AMPs. In many instances, there is lax, outdated, or no, modern-day control of livestock grazing disturbance and impacts.

Thus, the adverse impacts of grazing, many that lead directly to weed proliferation, have not been adequately evaluated under NEPA, nor have natural events such as fire or drought been fully considered.

"Range" projects, whose aim is ostensibly to manage livestock and protect resources, are in a state of disrepair across the Forest, so "proper" livestock distribution, forage use and water distribution, as specified under the livestock management documents that do exist, are not occurring.

Such shocking failures to administer and review livestock grazing impacts are a primary cause of the accelerated weed invasions sweeping these nationally significant wild lands. Please see Attachment B (Belsky and Gelbard 2000).

Role of Livestock:

2.8 DEIS ES-2 mentions livestock LAST as a cause of weed infestation, and attempts to sidestep the profound role of livestock in disturbance and degradation of native vegetation that paves the way for weed invasion. How can you conduct an honest analysis if you consistently overlook, downplay and cast aside the link between grazing and weeds?

Role of Livestock Projects:

Fences, spring-gutting projects, pipelines, salt/mineral sites serve to concentrate livestock use in sites, leading to extensive zones of intense disturbance to soils, vegetation, habitats. These disturbed areas are ideal sites for invasion by exotic species. 2.9 A primary step that must be undertaken if you are to effectively grapple with weeds is to control, limit, and in many places eliminate livestock grazing impacts. As part of this EIS, you must establish criteria for removal of projects or that cause weed problems. You must also conduct a current survey of weediness associated with projects or activities (sheep bedding, parking of sheep wagons) that cause zones of livestock concentration, and control these.

2.8 Livestock have been included as one of the many vectors of weed transport and weed establishment. Taking action on livestock grazing as an allocated Forest use is beyond the scope of this analysis. See Section 2.E.

2.9 See Response 2.8. Project level activities are subject to specific project Best Management Practices during project planning and mitigation measures during project implementation.

2.10 **Conduct A Risk Assessment of Vulnerability of All Forest Lands To Weed Invasions.** You must conduct a current risk assessment of forest communities and their vulnerability to weed invasion. You rely on an ICBEMP assessment, but this is broad in nature and does not identify Forest-specific problems. Then, use this assessment as a means of identifying areas where major steps need to be taken to protect or restore native vegetation.

2.11 **Current Condition of Forest Lands:** You must conduct a current survey of ecological condition/site condition of all Forest lands – poor, fair, good, excellent,PNC. When is the last time such a survey was conducted? This is necessary to understand their vulnerability to weed invasion and proliferation. Please provide maps overlaying vegetation condition with weediness.

2.12 **Conduct Extensive Inventories for Weeds As Part of the EIS Process.** DEIS Map at 3-3 depicts "noxious Weed Infestations On and Near the Salmon-Challis National Forest", and highlights in red "area with inventoried infestations". This map and text fail to identify how many acres have actually been intensively inventoried – it appears that only the northern portion, and the immediate margins of roads have been inventoried. The Forest must, at a minimum, inventory all areas of livestock disturbance near projects, riparian habitats, etc. Throughout our reading of the EIS, we have not been able to determine acreages actually inventoried, and the intensity/completeness of inventories.

DEIS 32-2 states "documented, inventoried infestations of the 15 new and nine established weed species on the S-CNF now exceed 66,000 acres at more than 2,500 sites".

Restoration of Native Vegetation: Under all of your action alternatives, you have few provisions for restoration of native vegetation that is necessary to: 1)Prevent new invasions; 2) Provide critical permanent ground cover on treated sites.

We have often seen "dead zones" in wild lands, as in the Lost River Valley where agencies have sprayed leafy spurge, killing large Basin big sagebrush and all understory plants – yet only leafy spurge has regrown in these sites. Without stringent controls on grazing, and a dedicated effort to restore native vegetation, you will fail in control of weeds. Plus, our observations (as sprayed areas of leafy spurge infestations in the Big Lost) indicate that agencies are using long-lasting persistent herbicides that prevent all plant species except weeds from growing. Weeds (like leafy spurge) thrive in the "dead zones" created by persistent herbicides.

2.13 **Failure To Consider A Reasonable Range of Alternatives:** The EIS fails to consider a full and reasonable range of science-based alternatives.
You propose only three action alternatives – all of which are very similar, rely on a near-identical batch of invasive treatments, and vary primarily in relation to

2.10 Your suggestion is noted. The broad assessment is adequate at the vegetation community scale. Risk and vulnerability of plant communities are discussed in Section 3.C.1.b and Table 3-4 of the FEIS. Areas of major weed infestation are identified in Table 3-5 (and in further detail in Appendix B); the Proposed Action and alternatives describe the major steps to be taken to fulfill the purpose and need for the project. For a detailed discussion of strategies to eradicate, contain, and prevent further weed infestation, see FEIS Sections 2.C.2, 2.C.4, 2.C.5, and 2.C.6. This suite of management and treatment techniques is designed to protect and restore native vegetation affected by noxious weeds.

2.11 Your suggestion is noted. The FEIS has been revised to reflect the current condition of the rangeland and riparian areas. See Section 3.C.1.b.4 and Map 3-9.

2.12 Appendix B and Map 3-1 of the FEIS display the acres and locations of the inventoried weed sites as of 2001.

2.13 The Forest Service looked at a number of alternatives, but, as noted in Section 2.D, four were selected for full detailed analysis. Section 2.E describes the rationale for eliminating alternatives.

allowable methods of herbicide application. Preferred action: aerial application, one alt. no herbicide, other only ground herbiciding.

There is absolutely no evidence that controlled grazing will be a mid or long term solution for any of the weed problems. Sure Angora goats might eat leafy spurge, but what will grow in its place? Intensive "controlled" grazing leads to new
2.14 intensive and extensive zones of disturbance. Please provide scientific literature that supports your claims about the effectiveness of grazing in controlling weeds.

There is also apparently little variation among the non-spray components of all alternatives, with the same amount of goat grazing (100 acres) occurring in all action alternatives.

The DEIS states that you received public comment that supported an additional alternative that focused on a "proactive prevention approach ... taking action on numerous human uses known to cause site disturbance, spread seeds, and exacerbate weed expansion (roads, logging, grazing, mining, ...OHVs". Plus, the Weed EIS Team concluded there was need for further review. DEIS 2-5,6.

DEIS at 2-7 states public comment and concern clearly identified: 6. " ... there appears to be reasonable support from the public for the need to address human-caused activities or uses that lead to, or exacerbate, weed expansion, encroachment, establishment, namely livestock grazing, logging, roads, mining, and recreation (OHVs). These concerns led to an additional issue, and "7. Human uses exacerbate the spread and establishment of noxious and invasive species and non-native weeds. Without a proactive prevention strategy that limits, modifies or curtails current human uses on the S-CNF, any type of physical treatment will not be successful in controlling weeds".

"This issue led to the development and consideration of an additional alternative – the Proactive Prevention Alternative – that focuses on taking action on the numerous human use activities ... ".

Yet, you have failed to analyze the PPA as a viable alternative. You have hidden behind a claim that consideration of preventive strategies and passive treatments in such an alternative would require a Land Use Plan amendment. DEIS at 2-48: The description of the PPA here states "the intent of the alt. is to address and
2.15 cont. take action on human activities that promote the spread of weeds, specifically close roads, modify livestock grazing permits, and alter existing timber, mining and recreational OHV activities. The purpose of the proposed project is to eradicate, contain, and control the spread and establishment of noxious and invasive non-native weed species." You can not separate the two in this manner, as eradication, containment and control of weeds requires a full arsenal of methods, including prevention and passive treatment.

2.14 See Chapter 9, References.

2.15 See Response 2.1.

2.15 cont. If you are correct that this would require a Land Use Plan amendment and can not be done as part of this EIS process, then it is necessary that you undertake a parallel Land Use Plan amendment process that addresses these necessary actions/components of comprehensive weed strategy.

2.16 You claim that Weed Prevention is already part of Integrated Weed Management, yet prevention is adequately incorporated in the Proposed Alt. Your IWM strategy has been in place under the current weed management actions on the Forest, and it has clearly been completely ineffective, as weeds are exploding on the Forest. that there are already 66,537 acres of inventoried weed infestations at 2,724 sites on the Forest.

The IWM includes such things as requiring only weed free hay – yet you annually allow over 150,000 AUMs of unquarantined cattle -with weed seeds in their gut, fur, and mud on hooves –to be turned out on Forest lands, and to roam freely amidst large and nascent weed infestations, further spreading weeds as well as creating ideal conditions for weed spread and establishment. If you can control outfitters bringing in weeded hay, you can control livestock permittees bringing in weeded cattle. Out fitting is a PERMITTED activity, just like livestock grazing, and you are considering this permitted activity as part of the DEIS.

We suggest the following Livestock BMPs:

2.17 All livestock must be quarantined for 3-5 days before being turned out on Forest lands.

All livestock must be washed to remove weeds in fur, mud on hooves, etc.

No livestock may be turned out in pastures with known weed infestations until infestations are controlled and vegetation restored.

Within all pastures grazed by livestock, zones of livestock disturbance (bare soils, poor condition native vegetation) must be identified, livestock impacts removed, and measures taken to restore vegetation.

The current "alarming" rate of weed expansion on Forest lands (as is documented in this DEIS) demonstrates that your plodding current actions are NOT working. Instead of falsely terming your actions INTEGRATED WEED management, we suggest you term it SEGREGATED WEED management, as you are only addressing a limited subset of activities that affect weeds and the health of Forest lands on the Forest.

The atrocious conditions of many upland and riparian areas on the Forest (for example, the Morgan Creek and Pass Creek allotments) leave such lands extremely vulnerable to invasive species. Dramatic improvements in the vigor

2.16 See Response 2.1.

2.17 Your suggestions are noted.

and condition of native vegetation must be a fundamental part of any Integrated Weed program.

2.18 **Success of Past Spray Efforts:** The Forest has been spraying weeds for decades. Please provide detailed analyses of areas sprayed, chemicals used, current weediness of these areas, current condition of native vegetation in these sites, evidence of restoration, etc. The public deserves an in-depth analysis of the effectiveness (including cost effectiveness) of the segregated and limited IWM techniques that this DEIS seeks to perpetuate.

BMPs and Mitigation Measures Are Inadequate: You will never be able to eradicate, control, contain, etc. unless you eliminate, control or sharply contain grazing and OHV activity.

We support the use of the minimum tool strategy DEIS at ES-7 for weed treatments, but you are not honestly considering a full range of tools. For example, if you decide to handcut, rather than spray, weeds at a site, and continue to let grazing and trampling occur at the site, we believe you have not considered the full range of minimum tools available. Limiting grazing is an essential and complementary tool if you are truly to eradicate, control,

2.19 **Disturbance to Nesting Birds, Fawning Mammals And Resultant Mortaility Is Not Addressed:** No chemical treatment can occur during periods when migratory birds are nesting, or you will violate the Migratory Bird Treaty Act, and President Clinton's Executive Order Birds and nests will exposed to predation caused by defoliation. Eggs and nestlings will be exposed to harmful chemicals and other spray ingredients, such as petroleum-based carriers.

2.20 **What Are Chemical/Biocide Analyses Here To Be Used For?** Please clearly state whether the clearances/ analysis of chemicals in this EIS effort will be used as a basis for clearing/analysis of various chemicals for use in projects that might involve purported hazardous fuels reductions, canopy cover alteration, and other vegetation manipulation. Will this EIS provide "cover" for future use of the chemicals discussed here in non-exotic species killing/control?

Some General Comments/Questions on the DEIS

DEIS at 2-9. Mechanical treatment is great work for fire crews and fire staff that has burgeoned under abundant fire funds. Your description of the effects of mechanical treatment stimulating regrowth of leafy spurge and other weeds contradicts your reliance on grazing as a "tool" of weed control. Here, when you are lamenting the human work involved, you reject this as effective. Yet you propose using grazing as a control.

DEIS at 2-10. Given that large areas of the Forest that have been surveyed show serious weed problems, it appears to us that you already have large, widespread

2.18 Your suggestion is noted. The FEIS has been revised to include a discussion of the effectiveness of previous weed treatments. See Sections 1.C.1 and 1.C.2.

2.19 The existing analyses in Chapter 4 are sound. The implementation of mitigation measures, BMPs, and SOPs supports the conclusion that impacts to migrating populations, as well as eggs and nestling's, will not be significant. Impacts would not be expected to result in violations of the Migratory Bird Treaty Act, which focuses on direct takings and not on impacting habitat. Furthermore, Executive Order 13186, which defines the responsibilities of Federal agencies to protect migratory birds under the four Migratory Bird Treaties, requires Federal agencies, within the scope of their regular activities, to control the spread and establishment in the wild of exotic animals and plants that may harm migratory birds and their habitat. Controlling the establishment and spread of exotic plants, and thereby improving and protecting existing wildlife habitat, is the objective of this project.

2.20 The actions described are beyond the scope and the purpose and need of this FEIS.

populations of noxious weeds like knapweed (a situation that you describe as needing biological control), then why do you propose as your preferred
2.21 alternative treating only relatively small acres with biological controls on an annual basis?

Controlled Grazing Treatment. The effectiveness of this practice has never been proven.

Chemicals - You propose using a broad range of biocides as herbicides here. 2,4-D, chlorsulfuron, clopyralid, dicamba, Fosamine, glyphosate, imazapic, metsulfuron methyl, picloram, sulfometuroan methyl, triclopyr, and combinations of herbicides. We are alarmed at the use of these known harmful chemicals like Tordon.

2.22 You have conducted no analysis to determine the harmful effects of these chemicals, when used alone or in combination, on human health, wildlife, integrity of ecosystems, waters, soils, etc.

We support your use of scythe and WOW, as they do not appear to contain carcinogenic and persistent chemicals, unlike all the rest of the witches brew of biocides that you are proposing to use.

2.23 Cumulative impacts of use of biocides are not adequately assessed. For example, APHIS proposes widespread spraying of grasshoppers with biocides in lands south of the 45 degree parallel. How will you assess cumulative impacts of their spraying of insecticides combined with your spraying herbicides?

2.24 DEIS at 2-17. How will you possibly be able "eradicate new populations of weeds" if you have not conducted a baseline inventor of all lands? It will be impossible to identify "new" weed infestations if you do not establish a baseline n all Forest lands.

DEIS at 2-18, 19. Discussion of Restoration and monitoring is very limited and inadequate. YOU have failed to grapple with livestock grazing in any way or shape form here, except to talk about contolled grazing as a treatment.

2.25 DEIS 2-19. What are the bounds on your "adaptive strategy"?

DEIS at 2-27. It is ridiculous to require certified weed free hay, groomed pack animals, etc. and not take action to stop weed-seed infested cattle and sheep from being moved freely about (trailing, turnout, movement between pastures) everywhere on the Forest.

2.26 How did you determine the buffer from fish-bearing streams? Is it based on science or convenience/desire to do less hand work?

2.21 A full spectrum of treatment options must be available to meet the purpose and need of this FEIS. Appendix C describes the treatment methods proposed for each weed species. Biological controls are proposed for containment, not eradication. Biological controls would be utilized where the site characteristics are appropriate for the most success. Section 2.C.1.b of the FEIS describes biological controls and the pitfalls associated with this treatment method. Additionally, more than 22 percent of the acres treated under the Proposed Action would be treated with biological agents either individually or in combination with other treatments. The use of biological controls is increased in Alternatives 1 and 2; however, the goals for these alternatives are less aggressive than the Proposed Action in part due to the limitations of biological controls.

2.22 Chapter 4 analyzes in detail the use of chemicals. It provides a thorough and sound evaluation of the proposed chemicals and their effects on all resources. The Environmental Protection Agency (EPA) has prepared a synergistic evaluation and model of combinations of chemicals, which was reviewed for this FEIS.

2.23 Cumulative effects are addressed in Chapter 4 for past, present, and reasonably foreseeable future actions. The activities proposed by the Agricultural Animal and Plant Health Inspection Service (APHIS) are not reasonably foreseeable to occur on or near the S-CNF due to: 1) low populations of target insects and; 2) the application of insecticides is by request only and the S-CNF does not anticipate requesting APHIS to treat candidate populations. See Addendum to Site-specific Environmental Assessment: Rangeland Grasshopper and Mormon Cricket Suppression Program Idaho – EA number ID-PPQ-GH2001-001 (2003).

2.24 It is not possible to inventory the entire Forest at one time. New areas are being inventoried every year. The baseline in the FEIS includes all inventoried areas through 2001. "New" does not exclusively mean additional infestations of existing species, but also includes "new" species not previously present in the existing S-CNF baselines. These will receive immediate priority.

2.25 The question is unclear. The adaptive strategy is thoroughly described in Section 2.C.4.

2.26 The buffer zones are based on several components: 1) physical characteristics of chemicals (see Appendix J); 2) spray methods and equipment; 3) drift rates (see Appendix E); 4) the presence – or absence – of sensitive resources; and 5) weather conditions. The FEIS cites monitoring studies on the effectiveness of buffers on the Salmon-Challis (ID), Sierra, Stanislaus, and Eldorado (CA), and Lolo (MT) National Forests. From these studies the S-CNF established buffer zones for conservative mitigation of spraying effects near all sensitive resources, including fish-bearing streams. The FEIS includes a full discussion of the buffer zones (see Section 4.B.2).

2.27 Management/mitigation – Revegetation should use all native species, and removal of livestock must occur until weeds have been eradicated.

2.28 DEIS at 2-44. Why is there a 100 ft avoidance for potable springs only? Why are you not avoiding ALL chemical treatment within 100 ft. of ALL springs? What about hikers or backpackers or sage grouse that may use water from springs and streams? Is it ok for them to drink poisoned water?

2.29 You must expand OHV closures to protect from new infestations.

2.30 DEIS at 2-44, 45. Why in the world are you proposing to use Picloram (TORDON) on any public lands at any time? Your mitigation measures here are laughable. How will the average Forest Service technician/ contractor out on a hot summer day driving along a road (Or zipping crosscountry on spray-rig 4-wheeler) determine when they are within 50 feet of a perennial or intermittent stream, or areas with water tables less than 5 feet deep? And have you analyzed impacts of crosscountry travel by spray equipment?

2.31 We are shocked that the Forest would propose to use Tordon,Tebuthiuron and other likely carcinogens that are known to leach into ground water – in what is certain to be a futile effort to stem weed spread – futile because you steadfastly fail to address the causes of weed proliferation – livestock grazing and motorized vehicle disturbance and transport of weeds . Until you address these, your efforts are bound to fail, and it makes no sense to endanger public health and safety

2.32 spraying biocides near waters. We are particularly alarmed about the use of these chemicals in TES species watersheds. More is being learned about the chemical sensitivity of aquatic species every year, and use of these pernicious poisons that you propose to employ will further harm ESA-listed species.

2.33 Have you conducted extensive baseline surveys for rare plants? If not, there is no way any person spraying biocides can determine if they are within 100 feet of sensitive plant populations.

2.34 Please provide maps of sufficient detail in the FEIS that show ALL avoidance areas as stated in your mitigation measures here.

2.35 Many people have chemical sensitivities. You need to allow private landowners with sensitivities to veto spray application on neighboring Forest lands. All areas to be sprayed must be posted prior to and after spraying, with name of chemical clearly stated. Buffers for campgrounds are far too small.

2.36 Dyes must be used in all instances to allow the public to identify and avoid areas where biocides are used.

2.27 The use of non-native species in restoration efforts is described Section 2.C.3 of the FEIS. The management of revegetated sites will be determined on a site-specific basis and incorporated through annual operation instructions (AOI). If a site is revegetated, and it is determined that livestock must be removed, the AOI will include this management strategy on a site-specific basis.

2.28 Adequate mitigation measures and analysis are provided in Section 2.D.3. All water bodies, including non-potable springs, are mitigated. However, the S-CNF has determined to provide further protection to potable springs because of their culinary nature. Similarly, the S-CNF has provided additional mitigation measures within watersheds supporting culinary water sources.

2.29 See Response 2.1.

2.30 Your comment is noted. The potential for minimal impacts to vegetation and soils from off-road chemical treatment activities is identified in Sections 4.B.1 and 4.C.3. Cross-country travel during treatment activities could be a limited source of soil displacement and vegetation disturbance. Off-road travel in riparian habitat conservation areas (RHCAs) is not permitted.

2.31 Your opinion is noted. The S-CNF is not proposing the use of Tebuthiuron.

2.32 Your opinion is noted. See Sections 4.B.2 and 4.B.3 of the FEIS.

2.33 Extensive Forest-wide surveys for rare plants have not been completed. However, Section 2.D.3.b of the FEIS describes the process for weed treatments in areas where no survey has been completed.

2.34 Maps of sufficient detail to identify rare plant locations covering more than 3 million acres would be of little value. However, several additional maps have been included in the FEIS for clarification. The site-specific implementation process (Section 2.C.6) describes the process for avoiding sensitive resources and areas.

2.35 There are several mitigating safeguards for people who have sensitivities. Reasonable buffers have been applied to all sensitive resources and established user areas. Campgrounds will be closed, and adjacent landowners will be notified in advance. See Response 2.26 and Section 2.D.3.b of the FEIS.

2.36 See Section 2.D.3.b.

We are alarmed at your proposal to allow aerial application of poisons like Tordon in rough, mountainous terrain subject to erratic wind shifts, down-canyon movement of air, etc.

2.37 300 feet avoidance area of campgrounds (aerial application) is grossly inadequate – you should avoid campgrounds by 5 miles as part of any aerial use of biocide alternative. Likewise for the 300 feet avoidance (aerial) of fish-bearing streams, and 100 feet avoidance of non-fish bearing streams, intermittent streams, etc.

2.38 NO application of biocides should occur within 1 mile of campgrounds. Use hand methods, WOW, mowing.

2.39 Why do you propose to use weed-specific herbicides ONLY on big game winter range? Why don't pygmy rabbits, Brewer's sparrow, etc. also receive this care/mitigation measures?

DEIS 3-1 describes great values of lands – these values need effective action, not futile piecemeal spraying.

2.40 You have documented 66,000 acres of infestations at 2500 sites. Both map at 3-3, and text 3-2 to 5, fail to indicate which Forest lands have been the subject of intensive weed inventories.

2.41 DEIS at 3-6 documents lands in the northern part of the Forest where proliferation of roads may have led to widespread weediness. What actions have been taken to close these roads? Restore native vegetation? Promote vigor and health of native vegetation? Control livestock use? What are the standards for livestock use (utilization levels, etc.) on these Forest lands? Has there been compliance with these standards? What actions have you taken to increase health of lands? DEIS map 3-3 shows big blobs of solid red, indicating inventoried areas with weeds near North Fork and Gibbonsville. These lands are not solid roads. This means that livestock must have been the very effective agents of weed spread throughout these lands. What grazing allotments are these? What does monitoring show about grazing impacts?

2.42 What is the logging history of these lands? What role has logging or tree thinning played in spread and proliferation of weeds on the Forest?

2.43 DEIS at 3-6. You describe a three-phase process of weed introduction, colonization and naturalization. For naturalization you describe weeds becoming "incorporated within the native flora". Please explain what this means.

2.44 What is a "vacated niche"???

2.37 See Responses 2.26 and 2.35.

2.38 Your suggestion is noted. Section 2.D.3.b and the decision tree shown in Figure 2-1 provide adequate safeguards and mitigation measures.

2.39 Big game winter range is a recognized and designated critical forage base for big game animals in the winter. Mitigation measures are in place to protect non-game species and their habitat, as well. Furthermore, these habitats are often over-lapping.

2.40 See Responses 2.24 and 2.12.

2.41 See Response 2.1.

2.42 It is recognized that past Forest activities have played a part in weed expansion. Project-level mitigation measures include restoration and weed control as part of the project activity. See Section 1.A.1 of the FEIS.

2.43 The Forest Service uses "incorporated within the native flora" to identify populations that have become established, reproducing components in an otherwise native vegetative community.

2.44 The Forest Service uses "vacated niche" when a species is removed from a native community. Competition for water, nutrients, and space is reduced, allowing a different and often invasive non-native species to become established.

While you abundantly describe weeds being transported along roads and trails, you only once mention livestock. Livestock are THE primary causal agent in
2.45 moving weeds into broad areas of non-roaded native vegetation. Plus, you fail to assess the role of logging/thinning in weed spread.

2.46 DEIS 3-19 describes plant communities susceptible to weed invasions using broad ICBEMP descriptors. Table 3-4 describes, for example, dry grass/dry shrub, dry forest –pp, dry forest - df, riparian areas and burned areas as having High susceptibility to knapweed invasion. How many acres, and where, (please provide map) of each of these forest types , and the cool shrub forest type, have been inventoried for weeds on the Forest (see Table 3-5)? This is necessary for the public to understand the seriousness of the problem/risk of lands becoming weeded.

2.47 Dry Grass- You discuss the susceptibility of dry grass areas to cheatgrass. Aren't the dry shrub (Wyoming big sagebrush, threetip sagebrush, low sagebrush and black sagebrush types also susceptible?

2.48 Please greatly expand on the role of fire in causing and exacerbating weed invasions in Forest lands in this region? For example, hasn't rush skeletonweed proliferated in the Salmon River lands burned in 2000? This is vital information to be used in any analysis (which you must prepare here) of effects of wildfire or prescribed fire on spread and proliferation of weeds.

2.49 DEIS 3-25. What is the ecological condition of all riparian areas? Of all the various vegetation communities described here? For example, what percent of the Wyoming big sagebrush dry shrub community on the Forest is currently in good or better ecological condition?

A current inventory of ecological condition of Forest lands is essential to allow you to grapple with weed problems.

DEIS at 3-24 to 29 describes rare plant occurrences. On how many acres of the Forest have current surveys for rare plants been conducted? This is essential
2.50 baseline data if you are to follow the long list of BMPs/mitigation measures, as well as if you are to truly protect these species habitats from weeds. Please provide a map with rare plant locales identified.

2.51 Aquatics. DEIS at 3-39 to 46. Please greatly expand on the impact of livestock on aquatic species/habitats – their role in stream sedimentation, watershed destabilization, desertification, water quality impairment, etc. 20 fish species, 4 TES fish, and other rare aquatic species are affected!

We are alarmed at the actions that would occur under ALL action alternatives - i.e herbiciding in these significant riparian areas.

2.45 See Response 2.42.

2.46 Map 3-9 depicting these community types as potential vegetation groups (PVG) has been included in the FEIS (see Section 3.C.1). Table 3-5 displays the total acres and acres of weed infestation for each PVG.

2.47 The narrative has been clarified in Section 3.C.1.b.1 of the FEIS.

2.48 The role of fire is adequately addressed in Table 3-4 and supporting text. See also Sections 3.C.1.b.2 and 3.C.1.b.3.

2.49 Non-forested range and riparian condition is discussed in Section 3.C.1.b.4 of the FEIS.

2.50 See Responses 2.33 and 2.34. Appendix H shows the known distribution of sensitive plant populations for each watershed. The FEIS describes adequate mitigation measures and the site-specific implementation process.

2.51 A full analysis of cumulative impacts of livestock and other activities and actions on all S-CNF resources with varying levels of weed treatments is presented throughout Chapter 4. The description of cumulative impacts from other Forest activities on the resources, in and of themselves, is beyond the scope of this FEIS.

2.52 Columbia spotted frog, western toad, long-toed salamander and other amphibians are known to be highly susceptible to chemicals. How do all of the chemicals/biocides that you propose using affect these species?

We can not support ANY of your current alternatives.

2.53 Forest MIS aquatic species include bull trout, chinook salmon, steelhead, Westslope cutthroat trout and rainbow trout, and six taxonomic groups of macroinvertebrates. What are the groups of macroinvertebrates? What research has been done on the effects of the various biocides in the various sprays that you propose to use on aquatic species, and on all MIS species?

2.54 What might be the likelihood and also the effects of biocide contamination on PFC streams compared to unhealthy streams?

2.55 The condition of the uplands and riparian areas can dramatically affect runoff rates and levels of contamination with biocides you propose to use. You must collect, analyze, and present in a variety of formats (including tables, photos and maps) in the Final DEIS all information on current site condition. This is necessary to to allow you to develop adequate runoff/contmaination risk assessments, assess efficacy of various alternatives in addressing weeds, etc.

2.56 DEIS at 3-46. The discussion of wildlife here is woefully inadequate, and is heavily slanted towards huntable megafauna. Plummeting populations of native wildlife like pygmy rabbit and Brewer's sparrow are largely ignored. You must fully describe the various species, their habitats, their habitat requirements, and how various alternatives might affect all parts of their life cycles. For example, spraying herbicides during periods of nesting, fawning, birthing may result in mortality of a wide array of native wildlife, and "take" of migratory birds.

2.57 DEIS at 3-69 describes the impacts/effects of weeds on the hydrologic cycle. How does livestock grazing on top of weed infestations impact the hydrologic cycle? How does weed infestation exacerbate the impacts of livestock grazing to hydrologic cycles, aquatic species and habitats, recreational uses, etc.? You describe monotypic weed stands having only a single canopy layer and simplified root structures, affecting the patterns of runoff – increasing risks of "flashy" runoff events and sediment delivery to streams, as well as reduced water storage in soils, and reduced late season flows with late-season groundwater discharge

2.58 lowered. Given that you admit a full array of harmful impacts from weeds in riparian habitats and watersheds that are home to many ESA-listed species, you must take all steps to address the exploding weed problem on the Forest, and that includes methods of prevention, passive restoration, etc. and fully addressing grazing and roads.

2.52 Mitigation measures, BMPs, SOPs, and buffers are designed to minimize potential impacts to all aquatic resources. Analysis of the effect on amphibians, including these mitigation measures, is reviewed in Chapter 4. Because of their complex life cycle, amphibians are at risk from herbicide applications. According to the EPA, however, there is little information on the suspected dangers of the herbicides reviewed in the FEIS. Mitigation measures, BMPs, and buffer zones, along with low concentration levels of herbicides will reduce the risk of a significant adverse impact on amphibians to the greatest extent possible while still achieving the objective of reducing weed infestation, which degrades habitat for all wildlife.

2.53 See Chapter 9, References. The taxonomic groups of macroinvertebrates are discussed in Section 3.C.2.f of the FEIS. A full analysis of the effects is described in Sections 4.B.2 and 4.B.3.

2.54 PFC ratings describe how a stream functions hydrologically. Weeds inhibit hydrologic function by altering native vegetation, weakening streambanks, and increasing the amount of sediment reaching the stream. Potential impacts of chemical contaminants in the stream are not related to stream function.

2.55 A discussion of current condition is presented in Section 3.C.1.b.4 of the FEIS. The analysis of chemical application was presented for both a high run-off scenario and infiltration scenario. See Aquatic Resources (Section 4.B.2.b) and Soils, Geology, and Minerals (Section 4.C.3). The site-specific implementation process, the decision tree (Figure 2-1), and information in Appendix F for evaluating herbicide leaching sensitivity in uplands will all be used to identify the appropriate, site-specific treatment method.

2.56 There are virtually hundreds of species that occur on the S-CNF. It would be unreasonable to identify and assess all of the species individually. Management indicator species have been identified and are fully analyzed in Sections 4.B.2 and 4.B.3 of the FEIS. An additional accepted assessment approach was also presented utilizing representative wildlife groups and associated source habitats across the Forest. They are discussed in depth in Section 3.C.3, and analyzed for potential impacts in Section 4.B.3 of the FEIS.

2.57 Direct, indirect, and cumulative impacts are addressed throughout Chapter 4. The FEIS addresses impacts of weed presence and weed treatments on the hydrologic cycle. Other activities on the Forest that affect hydrologic cycle are also discussed (see Section 4.B.4). Cumulative impacts that consider the impacts of other actions when combined with weed treatment activities are discussed in detail. The analysis of the current hydrologic function is adequately described in Section 3.C.4 of the FEIS.

2.58 See Response 2.1.

DEIS at 3-71-3. The large number of water quality limited streams provides clear evidence of widespread watershed level degradation – again meaning that you must address causal factors and all possible treatments in the EIS.

2.59 DEIS at 3-74. Soils – please provide maps of soils with high infiltration rates, high erosion hazards, etc. This is necessary to understand possible groundwater contamination from biocides.

2.60 DEIS at 3-76. Just how much of an "economic force" is Forest grazing? Please provide an honest economic analysis undertaken by competent non-Ag. school economists. DEIS at 3-83 recognizes the shift to a more diversified, service-based economy.

2.61 Your analysis utterly fails to assess the true impacts of weeds and your proposed actions (and INACTION) on recreational uses and roadless lands. Please provide an economic analysis of various alternatives, and expanded alternatives (addressing causes) on recreational uses of the affected lands.

2.62 DEIS at 4-2. Identification and assessment of cumulative impacts is inadequate. You must address actions on lands in other ownerships, and effects of multiple stressors on wild ecosystems.

2.63 DEIS at 4-9 - You predict that cumulative effects of treatments are likely to be highly beneficial to native plant communities. Since you have been conducting ALL the activities – except aerial spraying – please provide an honest evaluation of success/beneficial outcomes of all lands treated to date. If these actions are beneficial to native communities –why are weeds exploding on the Forest?

2.64 DEIS at 4-3 lists an annual rate of weed spread of 17 percent, with knapweed 24 percent. Here, you fail to assess effects of livestock, OHV activity, and loggin/thinning in weed spread.

2.65 How do the characteristics here affect "worst case scenarios"/risk assessments?

2.66 You have failed to analyze the impacts of foreseeable vegetation alteration projects as they relate to values affected by your weed actions. Your array of spray actions, without addressing causes of disturbance, will only lead to further impacts to native species.

DEIS at Table 4-2. You only provide data on the impacts of ONE biocide – Picloram – on fish in Table 4-2. Yet you propose to use a witches brew of chemicals in sensitive riparian and TES habitats.

2.67 DEIS at 4-18. Please provide the full Forest Service study that you cite for claiming that if herbicide concentrations are equal to or less than MATC, then all aquatic species will be reasonably protected. Your worst case scenarios fail to

2.59 A Forest-wide map identifying these soil characteristics would be uninformative at this scale, since over 500 soil mapping units have been developed on the Forest. Map 3-10 showing the geology on the Forest is presented in the FEIS. The description and analysis of soil characteristics is closely related to the geology. See Sections 3.D.3, 4.B.2, and 4.C.3.

2.60 An economic study on the viability of livestock grazing is not pertinent to this FEIS. The information in Chapter 3 is presented to provide an overview of the various socioeconomic structures affecting the Forest, and is useful for comparing alternatives and goals.

2.61 The descriptions of weed treatments and their effects on recreation activities and local economies are adequately discussed in Sections 3.E.4, 4.C.4.a, and 4.D.4.a.

2.62 The discussion of the cumulative effects in the Introduction of Chapter 4 (Section 4.A) introduces the issues surrounding these effects. Cumulative effects are fully discussed throughout Chapter 4.

2.63 See Response 2.18. Weeds have exploded on the Forest due to a lack of a full range of treatment options and limited treatment acreages.

2.64 The added effects of these activities were not considered in the calculations. The rate of spread calculations are based on climate and plant characteristics (such as a species' capability to reproduce, physiology, and seed viability).

2.65 The comment is unclear, however, see Chapter 4 for a description of worst-case scenarios and risk assessments.

2.66 If this comment is referring to current and future Forest project activities, project-level mitigation strategies are reviewed in Section 1.A.1.

2.67 A full discussion and support references are provided as the basis for the conclusions in Table 4-2 and the accompanying text.

take into account soil compaction, stripping of vegetation cover, loss of cryptogamic cover in watersheds subject to various grazing levels.

DEIS at 4-23. We are shocked that you would still even consider using Picloram after finding that your "low flow watershed" model shows that you could only safely treat 1 to 2 acres per day!

2.68 DEIS at 4-25. Leaching. You describe Picloram as a "relatively mobile, persistent and toxic herbicide". Why do you cite NO studies that show the harmful and documented past problems with the herbicides you propose to use? Everything from human miscarriages to amphibian deformities?

Wind-drift can be extensive – especially in steep country with downslope movement of air – and variable wind gusts.

Table 4-3 presents a highly biased and skewed assessment of relative benefits and threats of the proposed action.

2.69 DEIS at 4-41 fails to identify loss of native vegetation and resultant likely loss of insects from death of non-target plants under the proposed action –especially aerial application.

There is scientific documentation of the effects of pesticides on sage grouse in southern Idaho. Many Forest lands lie south of 45 degrees North – where APHIS
2.70 will be spraying to kill native insects. How do the various herbicides and their contaminants and their breakdown products interact with APHIS sprays?

2.71 DEIS at 4-48. You can NOT predict no adverse impact on surface water. Plus, you propose to kill weeds, yet fail to take concrete measures to restore vegetation to sprayed sites.

2.72 Your array of biocides includes chemical compounds designed to kill woody vegetation. We are unaware of any significant infestation of non-native woody species on the Forest. Are you planning to use the chemicals described here in controlling native vegetation, thinning, hazardous fuels reduction and other projects? You have NOT stated that this is the case. Is it? Will this EIS serve as the analysis for chemicals to be used in spending federal fire and other funds on vegetation projects?

2.73 You need to prepare a Supplemental DEIS that presents a fully fleshed PPA alternative, as well as other alternatives that incorporate a blending of some spray as last resort with PPA components. These are all fully reasonable.

We are submitting a full alternative (Attachment A) for your inclusion in this SDEIS effort.

2.68 A thorough analysis and complete reference citations are presented in Chapter 4 and Chapter 9 of the FEIS, respectively. Some reproductive and developmental problems in wildlife populations have been attributed to endocrine disrupting chemicals, but recent EPA reviews note that evidence of other effects is far from conclusive.

2.69 Potential effects to native vegetation are described further in the FEIS in Section 4.B.1 and impacts to wildlife habitat in Section 4.B.3. If mortality to non-target native vegetation should occur, it would only minimally impact dependent insectivores due to the very localized and small area affected.

2.70 See Response 2.23.

2.71 Section 4.C.1.a, Surface Water, of the FEIS has been clarified to indicate that the No Action Alternative is not expected to result in adverse impacts to surface water. The FEIS discloses the potential for adverse effects. However, any effects are expected to be minimal with the application of mitigation measures, BMPs, and SOPs. See Section 4.C.1.a. The need for restoration will be determined on a site-specific basis, preferring natural restoration discussed in Section 2.C.3.

2.72 See Response 2.20. Spraying native vegetation for purposes of fuel reduction is not part of the purpose and need described for this FEIS.

2.73 See Responses 2.1 and 2.5 and Section 2.E.

2.74 You must also develop alternatives that incorporate limited hand chemical application (as a last resort) with mechanical treatments and passive and restoration techniques.

We will be happy to meet with you at any time if you need further clarification of the alternative that we have submitted.

Sincerely,

Katie Fite
Committee for the High Desert
PO Box 2863
Boise, ID 83701

Jon Marvel
Western Watersheds Project
PO Box 1770
Hailey, ID 83333

2.74 Your suggestion is closely related to the No Action Alternative in that chemical applications would be limited. The No Action Alternative is discussed throughout this FEIS.

THIS PAGE INTENTIONALLY LEFT BLANK

// ' ' ' ' ' '' '' ' '' ' ' ''

Restore Native Ecosystems Alternative

December _, 2002
An Alternative for Consideration in the
Region 6 Forest Service Invasive Species
Environmental Impact Statement

RESTORE NATIVE ECOSYSTEMS ALTERNATIVE

I. OVERVIEW

GOAL OVR 1: ECOLOGICAL INTEGRITY

Enhance the ecological integrity of Pacific Northwest national forest lands by restoring natural processes, native species, ecosystem function, and resilience of plant and animal communities (see Endnote 1)

Action-OVR 1

Give approximately equal overall effort to invasive species treatments that
a. Prevent conditions that favor invasive species; and
b. Restore ecological integrity on sites with invasive species (Endnote 2).

Action-OVR 2

Base treatments on the best available science and knowledge
a. Assess the likelihood that a proposed treatment will contribute to long-term ecological integrity and native species vegetation, citing documented, relevant case examples where possible.
b. If a treatment has not previously been attempted, cite scientific evidence that the treatment could be expected to contribute to long-term ecological integrity and native species vegetation.

Action-OVR 3

State objectives, standards and guidelines in clear, measurable terms, then measure and monitor the longterm outcomes of treatments so that they can be held accountable to both long-term and treatment goals.

Action-OVR 4

Perform restoration in a precautionary manner, recognizing that our understanding of complex ecosystems and the consequences of our activities is always limited.

Action-OVR 5

Include realistic and dedicated funding for, and an institutional commitment to, assessment, monitoring and appropriate response to monitoring results. Design and implement assessment (including the gathering of baseline data) and monitoring systems before activities commence.

Action-OVR 6

Encourage and facilitate informed public participation by local, regional and national stakeholders in such activities as assessment, monitoring, early detection of invading species, provision of new and scientific information, review of assessment and monitoring protocols, and analysis of treatment alternatives and outcomes.

Action-OVR 7

Provide:

1. clear and significant incentives (e.g., awards, grants, budgets) for prevention of invasive species and restoration of ecological integrity
2. disincentives for activities that encourage invasive species and delay restoration of native vegetation and recovery of ecological integrity.

Action-OVR 8

Ensure that treatments are accountable to public funding. Rely on best available science, awarding contracts on the basis of "best value" for restoration of native vegetation, avoid treatments of symptoms in the absence of addressing causes, and use local community workforces whenever feasible.

II. DEFINITIONS OF TERMS USED IN THE RESTORE NATIVE ECOSYSTEMS ALTERNATIVE

Actions Activities needed to achieve desired outcomes (goals, objectives, standards), including actions to restore or protect land health. These actions include proactive measures as well as criteria that shall be applied to guide day-to-day activities occurring on public land.

Active Restoration Treatments

Actions other than suspension of activities to restore ecological integrity or native species populations. Includes, but is not limited to:

1. Road and off-road vehicle route removal
2. Culvert removal
3. Prescribed burning
4. Use of biological control introductions, cultural methods, mechanical methods, chemical methods, and prescribed fire to directly act on invasive exotic species
5. Fish and wildlife habitat rehabilitation
6. Reintroduction of extirpated, native species
7. Planting and care of native seeds and plants
8. Reintroduction of soil biota required by native species, when necessary

Conservation Protection of landscape, ecological, and native genetic diversity and the processes that maintain them.

Ecological Integrity The ability of an ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats within the region.

Goals Goals are broad statements of desired outcomes (e.g., maintain ecosystem health and productivity).

Historical Fire Regimes

The historical range of variation of fire intervals, seasons, intensities by which native vegetation and wildlife have been shaped and to which they have adapted prior to the arrival of Euro-American settlers.

Invasive Species Exotic species shown by observation and/or scientific evidence to aggressively expand their occupancy of land, whether or not they are viewed as directly impacting economic activities, or have been listed on formal "noxious weed" lists. "Invasive species" does not include native species that increase in response to particular human activities (e.g., juniper, mesquite, sagebrush).

Invasive Species Treatments

Actions, which, based on scientific evidence, will effect the conservation and restoration of native vegetation communities. They include:

a. treatments that result in measurable soil, hydrological, and vegetation changes that resist invasive exotic species; and
b. active and passive restoration treatments that restore native vegetation and/or conditions favorable to native communities.

Objectives Objectives identify specific desired conditions for resources and have established timeframes for achievement and are usually quantifiable and measurable.

Passive Restoration Treatments

Suspension of activities that cause the loss of ecological integrity or native species populations in a specific area. Passive restoration treatments may include:

1. Area , road, and off-road vehicle route closures
2. Voluntary livestock permit retirement
3. Retirement of vacant livestock allotments
4. Livestock grazing exclosures (e.g., in aggressive weed infestations, uplands "at risk" of weed infestation, riparian areas, habitat of threatened or endangered species, springs, wetlands)
5. Restrictions of logging activities
6. Restrictions of oil and gas and mineral development, including allowing expired leases to remain expired
7. Restrictions on other human activities, as relevant
8. Prescribed natural fire (i.e., allowing fires to burn under predefined circumstances)

Prevention Treatments

Actions that avoid causing conditions that favor the presence of invasive species. Prevention is not limited to prevention of the *introduction* of invasive species.

Restoration The regaining of ecological integrity.

Standards Standards are limitations placed on management activities to ensure compliance with applicable laws and regulations or to limit the discretion authority in project decision-making. Compliance with relevant standards is mandatory.

Wildlands-Urban Interface

The area next to a home where fires most directly threaten structures and community spacc where there are flammable community values. -

III. INVASIVE SPECIES TREATMENT PLANNING

GOAL-PLAN 1

Invasive species treatments are based on assessments of (1) the condition of vegetation; (2) major human causes of invasive species introduction, establishment or spread; (3) opportunities for prevention of soil disturbance and invasive species; (4) opportunities for conservation of native vegetation; (5) results of past invasive species treatments; and (6) comparative likelihood of treatment options for achieving restoration of ecological integrity and native vegetation.

Action-PLAN 1

Using existing information initially, map vegetation within Region 6:
1. key areas of native vegetation and high ecological integrity; areas of mixed native and exotic vegetation and condition; and areas of significant invasive plant concentrations
2. suitable and critical habitat for habitat-specialist terrestrial and aquatic wildlife species
3. suitable habitat for wide-ranging species (e.g., bull trout and sage grouse) that require use of extensive or temporally diverse (e.g., winter/summer habitat) areas within the ecoregion
4. hotspots of plant and wildlife biodiversity
5. habitats "at risk" for exotic plant introduction, establishment, or spread

Action-PLAN 2

Refine maps by consulting conservation center databases and other sources of information and scientists on species occurrence.

Action-PLAN 3

Identify spatial and temporal association of particular plant invasions and compare and contrast with the spatial and temporal occurrence of past and continuing human activities.

Action-PLAN 4

Using overlays, identify those grazing allotments, proposed logging areas, and system and off-road vehicle roads that would facilitate invasive species introduction, establishment, and/or spread.

Action-PLAN 5

Using existing data, prepare and update, on an ongoing basis, maps of:
1. invasive exotic species concentrations; and
2. exotic species plantings on national forest lands, and, when available, adjacent private and public lands.

Action-PLAN 6

Prior to implementing site-specific invasive species treatments, prepare goals based on:
1. vegetation conditions, including invasive species concentrations
2. vulnerable wildlife and plant species and habitats (e.g., amphibian habitat, as many amphibians are highly vulnerable to herbicide applications and drift)

3. habitat important for threatened, endangered, and sensitive species and carnivores; connectivity for habitat-specialist wildlife
4. past and present activities within the watershed leading to exotic plant invasions
5. passive and active restoration needs
6. feasible restoration goals

IV. SITE SELECTION AND TREATMENT PRIORITIES

A. General

Action-PRIORITIES 1

Prioritize treatments shown to have a high probability of restoring natural processes and natural biotic communities (based on previous experiments or operational use) over treatments without this kind of documentation.

Action- PRIORITIES 2

Prioritize invasive plant treatments based on scientific evidence of efficacy as follows:
1. cessation of activities that facilitate exotic plant invasions (i.e., passive restoration)
2. active restoration treatments that incorporate passive restoration
3. active restoration treatments to restore ecological integrity and native vegetation

Action- PRIORITIES 3

Invasive plant prevention and native vegetation restoration treatments must utilize:
1. a precautionary approach, which, in the face of uncertain outcomes, proceeds experimentally and cautiously.
2. best available science and experiential and indigenous knowledge where applicable
3. an adaptive process that regularly incorporates revisions from monitoring and evaluation
4. a public process
5. the least intrusive techniques available to restore ecological integrity
6. the least risky interventions that are likely to provide the greatest ecological benefit
7. recovery plans for threatened and endangered species, or improvements on such plans
8. prevention strategies to reduce the need for chemical and mechanical treatments, and prescribed fire, so that the number of acres treated annually with these methods will decline over the life of the EIS

Action- PRIORITIES 4

Herbicide treatments must be of lower priority than non-chemical treatments, and shall be used only in conjunction with:
1. elimination or reduction of the conditions that have favored the presence of invasive species
2. encouragement of conditions that resist invasive species (see Endnote 3)

Action- PRIORITIES 5

Prior to implementing a site-specific treatment:
1. identify and prioritize restoration options

2. select the least intrusive/intensive methods that will effectively move the site toward the stated goals of ecological integrity
3. identify riparian conservation areas, consisting of the riparian community and hydrological energy zones; and an outer zone that provides buffers for the riparian conservation area

Action- PRIORITIES 6

State for all site-specific restoration projects and activities:
1. measurable conservation and restoration objectives
2. specific indicators and measures for determining results
3. timelines for analysis of whether goals, objectives and standards have been met
4. decision making processes that will be used to respond to analysis of results

B. Invasive species treatments

GOAL- PRIORITIES 1

The ecological impact of invasive species shall be minimized through conservation and restoration of native vegetation communities, watersheds and wildlife habitats.

Action- PRIORITIES 7

Give priority to two facets of the control of invasive species as defined in Executive Order No. 13112, "Invasive Species":

1. preventing the spread of invasive species from areas where they are present
2. restoring native species and habitats

Action- PRIORITIES 8

Give treatment priority to areas in which exotic plant invasions have adverse ecological impacts on native plant communities, watersheds, and wildlife habitats.

Action- PRIORITIES 9

Develop, with the input of knowledgeable scientists and citizens, a long-term (e.g., 100-year) plan for prevention and minimization of unwanted exotic vegetation within the planning area, and restoration of ecological integrity, including native vegetation. Short-term plans (e.g., 1, 5, or 10 year horizons) will be integrated within the 100-year plan; all shall emphasize experimentation and adaptation.

Action- PRIORITIES 10

The long term invasive species plan for integrated agency action shall include:
1. identification and lessening of the conditions that cause or favor the introduction, establishment, and spread of invasive species, and methods to ameliorate those conditions
2. plans for preservation of intact ecosystems from invasions
3. plans for preservation or restoration of historical disturbance regimes
4. restoration of the native vegetation community, via seeding and planting, to increase resistance to invasion
5. active vegetation treatments to reduce the abundance of invasive exotic species populations

C. Prescribed fire and fire suppression for invasive species prevention

GOAL- PRIORITIES 2

Natural fire regimes and native vegetation types will be restored, wherever feasible.

Action- PRIORITIES 11

Collect baseline data on historical fire regimes and plant and animal communities to use as a guide for restoration activities.

Action- PRIORITIES 12

Through an open process that fully includes the public and utilizes the best available science, develop Fire Management Plans that:

1. allow certain remote wildland areas to burn under carefully prescribed conditions where native vegetation would benefit
2. prescribe "Minimum Impact Suppression Tactics" where they would be most appropriate
3. prohibit aggressive soil-disturbing suppression methods where they would favor invasive species (e.g. bulldozers in roadless areas, chemical retardants in riparian areas)
4. determine ecological risks of fire – exotic species, population impacts - in all areas covered by plans, and carefully weigh benefits and risks as part of this process

Action- PRIORITIES 13

Based on Fire Management Plans, use fire suppression to protect:

1. areas of high ecological values that may be at risk from exotic species invasion following fire
2. areas where human life, developed property or irreplaceable ecological values or cultural resources (e.g., rare forest types, a major portion of the population of an endangered species, or pictographs) are at stake
3. areas that should be protected until prescribed burning or other treatments can reduce excess fuels
4. important wildlife habitats (e.g., within 2 miles of sage grouse leks, big game winter ranges)

Action- PRIORITIES 14

Fire fighting shall be avoided in:

1. areas where nearby natural fire barriers such as bodies of water or rocky ridges are likely to extinguish the fire
2. Wilderness Areas, Wilderness Study Areas, roadless areas/potential wilderness areas, Wild and Scenic Rivers, and Research Natural Areas, except when fire threatens to escape from these areas or permanently impair ecological or cultural values

Action- PRIORITIES 15

Mechanical fire suppression (i.e., with bulldozers) shall be avoided in riparian zones, steep slopes and other ecologically sensitive areas.

Action- PRIORITIES 16

Fuels reduction shall, except for restoration or conservation necessity:

1. minimize or avoid road construction and reconstruction
2. avoid roadless areas, old growth, endangered species habitat, riparian areas, ecological sensitive areas and other areas of high ecological integrity
3. avoid habitat of threatened and endangered species

Action- PRIORITIES 17

Fuels reduction treatments shall not:

1. increase motorized vehicle use or livestock access
2. supply biomass plants
3. increase fire risk through accumulation of activity fuels
4. include chaining
5. include clearcutting
6. limit native plant recovery through chipping or ground disturbing activities

V. MANAGEMENT AND TREATMENTS FOR PREVENTION OF INVASIVE SPECIES

A. General

Action-PREVENTION 1

In accordance with Executive Order 13112, Region 6 Forest Service shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the public benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Action- PREVENTION 2

Develop and implement comprehensive, science-based protocols designed to prevent the spread of invasive species in relation to all activities on Forest Service lands that have been identified in the scientific literature as primary facilitators of the establishment and spread of invasive species, watershed degradation, and loss of native species.

B. Specific Management Considerations

1. Livestock grazing

GOAL- PREVENTION 1

Minimize the introduction, establishment, and spread of invasive species due to livestock grazing.

Action- PREVENTION 3

In order to minimize the introduction, establishment, and spread of invasive species due to livestock grazing:

1. retire domestic livestock grazing permits at earliest opportunity where grazing has been found to promote invasion or persistence of invasive species
2. prioritize invasives prevention and restoration activities for areas where domestic livestock grazing has been permanently ended
3. manage livestock movement patterns to ensure animals are not moving seeds of invasive species from infested to uninfested areas
4. suspend livestock grazing on non-cohesive soils in perennially saturated meadows.
5. manage livestock grazing to favor native species
6. avoid grazing in systems still containing a strong component of native perennials, biological soil crusts, or other features known to act as natural barriers to invasion or increase of invasive exotic species

2. **Roads and Off-Road Vehicles**

GOAL- PREVENTION 2

The introduction, establishment and spread due to road, fire break, and off-road vehicle route construction, use, and maintenance shall be minimized.

Action- PREVENTION 4

Develop GIS maps and databases of all system (authorized and constructed) and non-system (user-created) roads and routes.

Action- PREVENTION 5

Precede all road or off-road vehicle route reconstruction, and any consideration of adding existing or illegal user-created roads and off-road vehicle routes to the transportation system, by NEPA analyses of their impacts, including potential to facilitate the spread of invasive species into native ecosystems.

Action- PREVENTION 6

Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species.

Action- PREVENTION 7

Implement measures that reduce the likelihood of weed seed dispersal, such as educating equipment operators, implementing appropriate protocols for vehicle and equipment washing, restricting recreational access and seasonal travel. Consider restricting road grading activities in areas with high populations of invasive species.

Action- PREVENTION 8

Implement full area closures that prohibit all motorized travel on lands outside of designated and NEPA analyzed transportation system roads and off-road vehicle routes.

Action- PREVENTION 9

Identify and designate for obliteration non-essential system and non-system roads and off-road vehicle routes that do not comply with native vegetation protection goals.

Action- PREVENTION 10

Cease new road construction and most road reconstruction in riparian areas.

Action- PREVENTION 11

Reclaim obliterated roads to native vegetation.

3. **Fire Suppression and Wildland-Urban Interface Treatments**

GOAL – PREVENTION 3

The introduction, establishment, and spread of invasive species due to fire suppression and wildland-urban interface treatments shall be minimized.

Action- PREVENTION 12

Utilize Minimum Impact Suppression Techniques and fully reclaim fire lines with native vegetation after fire emergency situations have ended, in order to prevent the spread of invasive species into the disturbed fire line corridors and to prevent the use of fire line corridors as illegal off-road vehicle travelways. Monitor each growing season for five years to eradicate introduced infestations.

Action- PREVENTION 13

Home-site treatments in the wildland-urban interface (e.g., thinning, pruning, and mowing of vegetation) must be undertaken primarily within a 20 - 60 meter (66-200 feet) intensive treatment zone where fires most directly threaten structures and human life.

Action- PREVENTION 14

Fire suppression operations shall:

1. clean equipment of invasive species seeds before moving equipment off roads to build fire breaks
2. seal all firebreaks to prevent off-road vehicle access

Action- PREVENTION 15

Defensible community space that may include public and private lands may be created within an additional treatment zone up to 500 meters (which includes the 60 meter home-site treatment zone) for fire fighter safety and protection of other flammable community values.

Action- PREVENTION 16

Long-term maintenance activities within the wildland-urban interface (i.e., prescribed burning, mechanical brush removal, etc.) as well as monitoring plans must be considered and a funding commitment secured before any action is undertaken.

Action- PREVENTION 17

Native vegetation restoration priorities must be identified through a restoration assessment before any restoration fuels reduction activities take place.

4. **Timber Sales**

GOAL- PREVENTION 4

The introduction, establishment, and spread of invasive species due to timber sales shall be minimized.

Action- PREVENTION 18

Maintain old-growth vegetation communities as bulwarks of vegetational resistance to invasion; minimize disturbance of old-growth or late seral vegetation communities; and, whenever possible, maintain intact forest canopies adjacent to areas such as roads and clearcuts where invasive species are abundant.

Action- PREVENTION 19

Design and plan timber sales for maximum prevention of introduction, spread, and establishment of invasive species, including pathogens.

5. **Altered Hydrological Regimes**

GOAL- PREVENTION 5

The introduction, establishment, and spread of invasive species due to altered flow regimes of rivers and streams shall be minimized.

Action- PREVENTION 20

Prioritize treatments of riparian areas where restoration is likely to be successful; e.g., areas where the natural historic flow regime is extant.

Action PREVENTION 21

Restore native historical flow regimes whenever it is possible to do so.

6. **Oil, Gas, and Mineral Exploration and Development**

GOAL- PREVENTION 6

The introduction, establishment, and spread of invasive species due to oil, gas, and mineral exploration and development shall be minimized.

Action- PREVENTION 22

Prohibit surface disturbance associated with oil and gas exploration, development, and production activities in areas with

1. endangered, threatened, candidate, sensitive, or rare plant species
2. steep slopes

Action-PREVENTION 23

Minimize surface disturbance associated with oil and gas exploration, development, and production activities in areas with sensitive soils.

Action- PREVENTION 24

In areas where seismic exploaration activities are permitted best available technologies must be used (i.e. helicopter shot-hole technologies over the use of 65,000 pound thumper trucks.

Action- PREVENTION 25

Locate wells and associated roads and pipelines on slopes less than 25% to avoid or minimize surface disturbance; on slopes greater than 25%, prohibit surface disturbing activities.

Action- PREVENTION 26

Keep removal and disturbance of vegetation to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites etc.) on both individual well locations and within oil and gas project areas.

Action- PREVENTION 27

Limit vehicular traffic to the running surface of roads and well locations as authorized in Applications for Permit to Drill (APD's) and Right of Ways (ROWs) thus prohibiting all traffic on two-tracks and trails near oil and gas well location and within oil and gas project areas.

Action- PREVENTION 28

Require that all gravel and other surfacing materials used for the project are free of noxious weeds.

Action- PREVENTION 29

Require each operator to submit a Surface Use Plan containing appropriate erosion control and revegetation measures (e.g., reintroduction of biological soil crust or mycorrhizae) with each APD request.

Action- PREVENTION 30

Require grading and landscaping during and after construction activities to minimize slopes, and installation of water bars on disturbed slopes in areas with unstable soils where seeding alone may not adequately control erosion.

Action- PREVENTION 31

Upon completion of drilling, require immediate reclamation of all portions of the pad that can be reclaimed using the soils originally removed during construction.

Action- PREVENTION 32

With each APD request, require the oil and gas operators to submit a reclamation plan that includes, but shall not be limited to:

1. identification of lands to be disturbed
2. detailed description of the baseline condition and resources on the land including existing uses, soil characteristics, slope, topography, vegetative cover, and productivity
3. methods to control erosion
4. plans to revegetate and restore the areas disturbed
5. measures that address steep slopes, sensitive soils, recontouring requirements, short-term seedbed preparation measures, seeding mixtures and methods, and long-term reclamation goals
6. steps to be taken to comply with federal, state, and local environmental laws, regulations, and policies

7. **Disturbance to biological soil crusts**

GOAL- PREVENTION 7

Biological soil crusts shall be maintained as a partial shield preventing establishment or spread of invasive exotic species (See Endnote 4).

Action- PREVENTION 33

Using existing data, map and describe the presence and integrity of biological soil crusts at the ecoregion and watershed levels; locally develop maps at the subwatershed level.

Action- PREVENTION 34

Prepare and implement a general plan for damaged biological soil crusts.

Action- PREVENTION 35

Prohibit livestock grazing for at least five years following a fire in areas capable of maintaining biological soil crusts. Return of livestock will be delayed past five years if significant recovery of the biological soil crust has not occurred.

VI. NATIVE VEGETATION RESTORATION TREATMENTS

A. Direct Treatments of Invasive Species

Action- RESTORATION 1

Direct treatments of invasive species shall be part of an over-all ecologically based restoration plan and may include:

1. Biological control
2. Cultural (manual) practices
3. Mechanical treatments
4. Chemical treatments
5. Prescribed fire

Action- RESTORATION 2

Base the selection of direct treatment methods on:

a. ecological priorities for restoration rather than potential economic benefits
b. size of the proposed treatment area, its location, and the biology of the target invasive species
c. the array of species that may be directly and indirectly adversely or beneficially affected
d. opportunities for minimized intrusion, extent, and risk
e. demonstrated record of restoring native vegetation

Action- RESTORATION 3

Except for treatment of small infestations without motorized equipment, prescribe direct treatments within designated wilderness or wilderness study areas only in conjunction with efforts to halt avoidable spread of invasive species into the wilderness from outside these areas.

Guideline- RESTORATION 1

Adopt the Carhart Model (Arthur Carhart National Wilderness Training Center) for completing minimum requirement analyses and minimum-impact tool analysis. The model assists managers in making administrative decisions concerning wilderness.

Action- RESTORATION 4

Prioritize nonchemical methods, unless shown to be ineffective, over chemical methods.

Action- RESTORATION 5

Small infestations have higher priority for active restoration treatments than large-scale infestations, with the exception of biological control. Use seasonal employees to detect and treat small infestations.

Action- RESTORATION 6

Use only those biological control agents that have been demonstrated to pose no threat to native species.

Action- RESTORATION 7

Use cultural treatments that have been shown effective in restoring native vegetation in scientific studies (e.g., use of properly timed fire, properly timed and managed goat grazing, mulching, and hand pulling)and conduct operational research to develop new, effective cultural treatments.

Action- RESTORATION 8

Plant and seed appropriate native species to compete with exotic species.

Action- RESTORATION 9

Use mechanical treatments that have been shown to be effective in restoring native vegetation in scientific studies (e.g., mowing, spot fire (flamer), mastication, weed eaters, mulching, and weed wrenches) and conduct operational research to develop new, effective mechanical treatments.

Action- RESTORATION 10

For chemical treatments, use application methods that minimize exposure to people, wildlife, and native plants. Spot treatment methods shall be preferred over broadcast methods.

Action- RESTORATION 11

Do not use broadcast herbicide treatments within 500 feet of endangered, threatened, candidate, sensitive, or rare plants. If herbicides are necessary for protection of a rare species, allow only application methods that apply herbicides only to the target plants and which expose only the target plants.

Action- RESTORATION 12

Avoid application of herbicides and prohibit broadcast spraying in riparian conservation areas. Avoid application of herbicides (e.g. atrazine) with adverse effects on aquatic species and amphibians.

Action-RESTORATION 13

Prohibit the use of herbicides in known aquatic and terrestrial amphibian habitat, including breeding, rearing, and overland dispersal areas.

Action- RESTORATION 14

Only herbicides that minimize adverse effects on environmental and human health, <u>based on knowledge of all ingredients in the formulation</u>, shall be utilized for chemical control.

Action- RESTORATION 15

Prohibit use of sulfonylurea herbicides and other acetolactate synthase-inhibiting herbicides due to their demonstrated ability to damage off-site native and crop species.

Action- RESTORATION 16

Design treatments to account for wildlife habitat needs, for instance, by the timing and location of activities. Avoid treatments during nesting season for migratory birds, and during identified sensitive periods for wildlife (e.g., critical wintering habitat for big game or sage grouse).

B. **Prescribed Fire and Fire Suppression**

Action- RESTORATION 17

Use prescribed fire only in concert with a restoration assessment with clear objectives for native plant composition, and where it will not increase invasive species.

Action- RESTORATION 18

Document consideration of the following prior to prescribed burns:
1. long-term damage to biological soil crusts
2. soil erosion through wind and runoff events
3. risk of spread of invasive species

Action- RESTORATION 19

Burned areas (natural or prescribed) must be protected from livestock grazing for at least five years and until measurable recovery criteria are met.

Action- RESTORATION 20

Prescribed burning teams shall:
1. use existing roads
2. limit ground disturbance

Action- RESTORATION 21

Minimize post-fire disturbance to burned areas to allow natural recovery.

Action- RESTORATION 22

Monitor all fire camps and helicopter spots for invasive species following fire.

C. **Forage Enhancement**

Action- RESTORATION 23

Conduct forage enhancement projects using only native species. Forage enhancement projects using non-native plant species will be carried out only in extremely degraded/severely altered systems as an intermediate step toward/placeholder for native restoration, accompanied by a full commitment to complete restoration of native species. This commitment must include funds set aside as part of the project, with specific deadlines for accomplishment. Any use of non-native species would occur only after extensive consultation with invasive plant experts inside US and abroad, with opportunity for public comment. Such forage enhancement projects must

incorporate ecological principles to encourage native species, and will not result in any net loss of native plant communities.

VII. REVEGETATION

Action-REVEGETATION 1

In revegetation efforts, whenever it is possible to do so, use native seed and seedlings that have been grown from seeds of locally adapted populations.

Action- REVEGETATION 2

If native seeds/plants are not available, revegetation projects will rarely be undertaken until native plant seed or plants become available. Non-native plant species will be used only in extremely degraded/severely altered systems as an intermediate step toward/placeholder for native restoration, accompanied by a full commitment to complete restoration of native species. This commitment must include funds set aside as part of the project, with specific deadlines for accomplishment.

Action- REVEGETATION 3

When reseeding with non-native species, certification must be provided that only species that have been documented as non-persistent are present in the seeding mixture.

Action- REVEGETATION 4

Assure availability of native seed and plants:

1. establish Forest Service contracting systems that will provide growers the necessary assurance their native, locally-adapted seed/plants will be purchased if grown
2. establish sufficient storage facilities for native seeds for major revegetation efforts

Action- REVEGETATION 5

Collaborate with federal, state, local and private land managers to reduce sale and planting of exotic invasive species, and increase availability and use of appropriate native species, with particular attention to inholdings and other lands adjacent to Forest Service lands.

Action- REVEGETATION 6

Focus invasive species public education programs on 10-20 of the most ecologically problematic local invasive species and those that have the potential to invade a given District. Include information about how these species are introduced to public lands.

Action- REVEGETATION 7

Following fire or other disturbances, do not propose reseeding unless it can be shown that natural regeneration is unlikely. Use native species unless they are not available. Always use certified weed-free seed.

VIII. MONITORING AND EVALUATION

Action-MONITOR 1

Before resources are committed to modify a plant community, gather baseline data to reflect existing conditions. If treatments are initiated, data shall be collected to substantiate whether or not any of the goals, objectives, and standards have been met. If baseline and post-treatment evaluation monies are not available, then the project shall not be approved (see Endnote 5).

Action-MONITOR 2

Monitoring must be used to:

1. inventory baseline conditions at the landscape, watershed, subwatershed, and project site levels
2. measure whether positive goals for native ecosystem recovery, conservation, and integrity are being attained
3. track biodiversity and health using an increaser/decreaser species procedure (including biological soil crusts, wildlife, and endemic/sensitive species).
4. practice precaution, retain flexibility, and respond to change, unforeseen harm, failure to reach objectives, and/or new information
5. quantify invasive species population changes
6. establish success/problems with specific prevention and restoration treatments in a variety of sites

Action-MONITOR 3

Monitoring and evaluation of vegetation treatments shall:

1. relate to the clearly stated objectives of all restoration projects
2. be an integral component of each restoration project
3. be incorporated into the essential costs of each project
4. use scientific principles of experimental design including replication and measurements from untreated control areas for comparison with treated locations
5. use a process responsive to all-party and scientific input
6. encourage involvement of local, regional and national stakeholders
7. be documented in a sixteen-state central database with assessments, objectives, monitoring procedures, and analyses in comparable formats
8. outline clear procedures for responding to monitoring and evaluation results

Action-MONITOR 4

Monitoring methods shall be:

1. Relevant: evaluates progress toward stated objectives
2. Sensitive: quickly detects change, shows trends, identifies critical features
3. Available: inexpensive, easily applied
4. Measurable: accurately quantifiable with acceptable methods
5. Defensible: minimally subject to individual bias
6. Verifiable: allows others applying the same methods to achieve similar results
7. Inclusive: avoids reductionism, where feasible
8. Scheduled: monitoring interval firmly scheduled

Action-MONITOR 5

Goals, objectives, and standards must be written for all projects tiered to this EIS. All projects must be monitored to determine if their goals, objections, standards, and guidelines are being met on schedule.

Action-MONITOR 6

Objectives and standards must be written in such a manner as to be measurable with concrete ecosystem indicators. Reliance on "professional judgment" without evidence should be minimized, so that outcomes and conclusions can be independently verified.

Action-MONITOR 7

Each Ranger District must prepare an annual monitoring report of all vegetation restoration projects (passive and active). These reports shall be available on forest and regional websites.

Action-MONITOR 8

Each Ranger District must annually report whether goals, objectives, and standards are being met. For those that are not being met, indicate plans for meeting them.

Action-MONITOR 9

All proposals to undertake a vegetation restoration activity must include a description of the monitoring that will be necessary to determine the compatibility of the activity with specific goals, objectives, and standards; and the treatment efficacy.

Action- MONITOR 10

Require the submission of an annual monitoring plan at or near any and all locations disturbed by oil and gas activities before granting approval of an Application for Permit to Drill.

Action-MONITOR 11

Annually monitor for five years all firelines, fire camps, helicopter spots, and fire retardant-treated areas for invasive species; eliminate introduced invasive species.

IX. TRIBAL RELATIONS FOR VEGETATION TREATMENTS

GOAL-TRIBES 1

Native American Indian concerns and issues relative to vegetation prevention and restoration treatments are addressed and mitigated in full collaboration with Native Tribal people.

Action-TRIBES 1

Consultation and collaboration with Native Tribes shall take place throughout the process of developing and implementing this EIS in accordance with Executive Order No. 13084, Consultation and Coordination with Indian Tribal Governments.

Action-TRIBES 2

Contact Native Tribal representatives from Tribal governments and organizations when vegetation treatments are being planned. Give particular attention to consultation and collaboration with local Tribal people when activities may affect Native cultural resources, hunting, fishing and gathering areas, sacred sites, or Tribal trust lands.

Action-TRIBES 3

Analyze treatment proposals pursuant to Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

Action-TRIBES 4

In collaboration with Tribal people, identify culturally significant plants used for food, basketweaving and other fibers, medicine, and ceremonial purposes.

Action-TRIBES 5

Develop protocols for enhancement and protection of culturally significant plants :

1. utilize traditional indigenous knowledge and wisdom to protect and enhance native vegetation communities, native resources, and ecosystems
2. prioritize treatments that will enhance and preserve culturally significant plants and animals
3. use minimal impact vegetation treatments where culturally significant species are known to occur. Vegetation treatments will not result in net loss of native species of importance to indigenous people for subsistence or cultural purposes

Action-TRIBES 6

Establish herbicide-free zones to protect culturally significant plant and wildlife resources.

Action-TRIBES 7

Provide notification to Indian communities of the exact locations, dates, and times that herbicide applications will take place, via letters of notification and posting in prominent locations (such as community bulletin boards and local post offices).

Action-TRIBES 8

Monitor the impacts of different vegetation treatments upon the viability and health of culturally significant plants and animals. Adapt treatment approaches as necessary to ensure culturally significant plant and animal resources are protected for seven generations.

X. COORDINATION, EDUCATION, AND PUBLIC AWARENESS

Action-CEPA 1

Identify activities that prevent, minimize, or reverse (as well as facilitate) the introduction, establishment, spread, and reinvasion of specific invasive exotic plant species (e.g., cheatgrass, ventanata, starthistle) on national forests and grasslands.

Action- CEPA2

Incorporate findings of the analysis (CEPA-1) in all site-specific treatment decisions.

Action- CEPA 3

Develop and maintain a central web site featuring prevention and passive and active restoration treatments, including:

1. scientific literature on treatment outcomes of relevance to national forest lands
2. Forest Service projects that have resulted in reestablishment of native vegetation, reintroduction of extirpated species, increase in sensitive species populations, reduction in acres needing restoration treatments, or reestablishment of natural fire regimes
3. successful Forest Service projects or programs to alter activities that have facilitated the introduction, establishment and spread of invasive species

Action- CEPA 4

Establish annual awards to Forest Service employees, Districts, and inholding landowners for accomplishments such as:

1. successful passive and active restoration of native vegetation
2. equality of effort to prevention and restoration treatments
3. exemplary monitoring
4. significant involvement of NGOs, students, and other volunteers in conservation and restoration activities

Action- CEPA 5

Eliminate funding based on acres of vegetation directly treated the previous year without (a) documented alteration of the conditions that favored the presence of the vegetation that was directly treated and (b) restoration programs to restore the site to native vegetation.

Guideline- CEPA 1

Offer simple invasive exotic species reporting forms to visitors in order to encourage the reporting of locations in which particular invasive species are present.

Action- CEPA 6

Educate the public, including owners of lands neighboring Forest Service lands, about prevention of invasive species introduction, establishment, and spread.

Endnotes

1. Vegetation (and thus invasive species) problems on Region 6 national forests include fragmentation; simplified ecosystems; invasive exotic species; altered fire regimes; compacted and otherwise heavily-disturbed soils; and impaired watersheds, with disturbed upland and riparian systems.

2. The three most common activities on public lands managed by the Forest Service that continue to contribute to invasive species are:
   - *Livestock grazing*, which compacts and bares soil, alters hydrological regimes to favor invasive species, preferentially eats particular native species and avoids eating unpalatable or armed invasive species, reduces reproduction and survival of native grasses, spreads and plants invasive species seeds, and diminishes or eliminates microbiotic crusts;
   - *Roads and motorized vehicles,* which compact and bare soil; damage riparian areas, steep slopes, and native vegetation; distribute and plant invasive species' seeds; and
   - *Logging,* which compacts and bares soils; damages native vegetation; transports invasive species' seeds; and often promotes the construction of roads.

   These activities lead to degraded soils and riparian areas, simplified native plant communities, widespread presence of invasive species propagules, and weakened native vegetation throughout much of the Forest Service-managed landscape.

3. This prioritization is essential, as herbicides can (1) have numerous adverse toxic effects on workers; nearby residents; beneficial soil organisms; and native plant, aquatic, terrestrial and avian species; (2) simplify the vegetation community; and (3) render the treated site more vulnerable to return of invasive species. Herbicides alone do not address the conditions that favor the introduction, establishment and spread of invasive species, and yet they are often used as stand-alone technological "fixes."

4. These crusts of lower plants and cyanobacteria cover soil surfaces between individual plants in healthy arid grasslands, shrublands, and dry woodlands. While they fix nitrogen, increase soil fertility, improve water infiltration, stabilize soils, and enhance the establishment of vascular plants, they also may provide a shield that reduces or prevents establishment and spread of exotic species. Biological soil crusts are particularly susceptible to damage from physical disturbance.

5. There is an obvious, admitted, ongoing, and institutional failure to adequately monitor, survey, and document the impacts of human activities on habitats, native vegetation, and native wildlife on federal public lands. Even when monitoring has occurred, land managers have rarely translated the findings into management improvements. Good intentions and monitoring plans have been insufficient to direct sufficient funding, staff, or attention to the outcomes of vegetation and other restoration treatments, among other human activities. It is essential that both the continuation and initiation of vegetation restoration activities be dependent upon prior adequate baseline and post-treatment monitoring. "We do what we get funded for" is neither a legally sufficient nor an ecologically responsible approach to the required, continuous, finding of compatibility of treatment activities with the goals, objectives, standards, and guidelines of this EIS.

6. Monitoring needs to be documented so that it can be independently reviewed by non-Forest Service scientists, the scientifically literate public, and others who are concerned about the ecological health of the nation's federal, public lands.

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

IDAHO DEPARTMENT OF
PARKS AND RECREATION

p.o. box 83720
boise, idaho 83720-0065

(208) 334-4199

fax (208) 334-3741

tdd 1-800-377-3529

street address
5657 warm springs avenue

www.idahoparks.org

December 31, 2002

William Diage, Planning Team
USDA Forest Service
50 Highway 93 South
Salmon, ID 83467

Re: Draft EIS Salmon-Challis National Forest Noxious Weed Management Program

Dear Mr. Diage:

My staff has reviewed the above referenced DEIS on Noxious Weed Management. The Idaho Department of Parks and Recreation (IDPR) supports implementing the Proposed Action. We also feel that it is the most effective of the alternatives for dealing with noxious weed infestations on the Salmon-Challis National Forest.

Controlling invasive species was one of the top five issues identified in the 2002 Idaho Outdoor Recreation survey, conducted by IDPR's Outdoor Recreation Data Center. Developing and maintaining programs to manage the problem is also an action item in the 2003-2007 Idaho Statewide Comprehensive Outdoor Recreation Plan. I applaud you for your efforts to address an issue of much public interest.

We are concerned with some of the impacts of spraying herbicides to recreational users, however we agree that the long term consequences of losing riparian areas and forage to noxious weeds would have a much larger and longer-term negative impact on recreation.

3.1 You indicate that the preferred alternative will not harm sensitive plant species or the plants that are gathered for medicinal, cultural, or culinary purposes. IDPR urges you to monitor possible affects to assure those assumptions are correct and to provide baseline data for future projects.

Thank you for the opportunity to submit our comments. If you have questions regarding the comments, please contact Outdoor Recreation Analyst Mary Lucachick, 208-334-4180, ext. 307.

Sincerely,

Rick Collignon, Director
Idaho Department of Parks and Recreation

3.1 Section 2.C.3 of the FEIS identifies monitoring goals and the basis for determining the effectiveness of treatment. This section of the FEIS has been revised to include additional monitoring objectives to evaluate the effectiveness of the mitigation measures.

January 7, 2003

Salmon Challis National Forest
50 Hwy 93 S
Salmon, Idaho 83467

RE: DEIS – Noxious Weeds

I support you proposed alternative for the most aggressive course of action for noxious weed management. Please accept the following comments regarding the DEIS.

1. Evidently the percent weed spread was used from the Frank Church. It appears to me the percent weed spread in the "Front Country" is much higher – probably because of more access.

4.1 2. Also, the projected weed spread in the DEIS is only for existing infestation and does not include new infestation. This issue of "new infestation" needs to be included in the projected weed acreage since the new infestations are a large contribution to the existing weed acreage.

4.2 3. When the new infestations are added to the more realistic percent weed spread – the weeds are spreading at a faster rate than the suggested treatment acreage of 16,000 acres on the forest. If the goal of the Forest is to control the weed spread then the treatment acreage needs to be higher than the expected spread of weeds on an ongoing basis.

4. With labor cost so expensive aerial application has got to be the main application method to treat such a large acreage. Also, the application cost verses the cost of the herbicide would suggest a longer acting herbicide would be more cost effective than short term chemicals. Example: tordon @ $78.00/gallon verses 2-4-D at $16/gallon. The 3 year life of the tordon on would be way more cost effective than the 2-4-D even though the initial cost of the 2-4-D is cheaper.

4.1 New infestations were not considered in the growth calculations. It is recognized that Forest-wide inventories are not complete and that new infestations will be discovered.

4.2 The selection of 18,000 acres per year was developed for analysis and comparison purposes in the FEIS. Actual annual treatment acres will not likely exceed 18,000 acres due to funding constraints.

5. The use of chemicals ia an important short term tool but the long term bio agents are a more reasonable and cost effective approach.

4.3 6. Since the cost of weed eradication is so expensive – a large part of the weed control program should be oriented to the management of the acres that are not weed infested yet.

4.4 7. Vehicles, especially ORU use, are the main source of weed spread in the "front country". Closing Forest land to vehicles during the times of noxious weed seed production should be done. Also, stock using Forest land should be on weed free feed for at least 5 days before going on Forest land.

When considering the amount of treatment acreage on the forest, the treatment area needs to be greater than the expected spread of weeds, otherwise the money being spent doesn't seem to be effective. Certainly there are budget and man power issues the forest has to work within but in the overall picture – the more control done <u>sooner</u> will be more cost effective than a program that plans less treatment in the near term and more treatment in the longer time frame.

Thanks for the opportunity to comment.

Joe Tonsmeire

4.3 Weed prevention practices are an integral part of the IWM concept and are incorporated within all project-level activities and Forest-use allocations. See Section 1.A.1 of the FEIS. See also Response 2.1.

4.4 See Response 2.1.

Formation

Formation Capital Corporation, US
812 Shoup Street, Salmon, ID. 83467
T: 208.756.4578. F: 208.756.2573
Website: www.formcap.com

Mr. William Diage, Ecologist
Planning Team
USDA Forest Service
50 Highway 93 South
Salmon, Idaho 83467

January 9, 2003

RE: DEIS Noxious Weed Management

Dear Mr. Diage:

The following comments are in response to the DEIS Noxious Weed Management Program as proposed in November, 2002. Please consider this response as input, in the positive sense, toward a document that will provide direction for the long-term ecosystem approach needed to address weed management.

The foundation for the EIS process is guided by the statements in the Purpose and Need (I.C.). I suggest a key point is missing in this section, which must be examined more completely as part of the preferred alternative, or a similar alternative, in the context of ecological restoration. This is concerned with the very principles of ecosystem management. An integral component of the adaptive strategy should be an aggressive policy for requiring the production and use of native plant
5.1 species where revegetation is part of the restoration process. Although the use of native plant species is frequently inferred in the DEIS, much stronger emphasis needs to be placed here in order to emphasize the role of natural succession as the primary driving force of ecological restoration.

As stated in the adaptive strategy, the scope of the EIS is intentionally broad. However, thi[illegible] not exclude a requirement for a strong, aggressive policy for locally adapted native spec[illegible]
5.2 revegetation is planned. This is essentially a policy for mandatory use of native plant spec[illegible] should be an agency commitment. If sufficient seed sources were not available then the emphasis would dictate that efforts be made for identification, collection and storage of adequate supplies to meet the planned needs. Such an effort would then become a part of the budgetary process.

Another item that could help this activity would be to describe a Desired Future Condition (50 years
5.3 hence) that activities could be measured against at specified intervals. Although not very well defined in most forest plans of the 80's, I believe such a goal needs to be part of this EIS in order to enhance the adaptive strategy and keep objectives and priorities in perspective.

I appreciate the coordinated effort the Salmon-Challis National Forest has made with the CWMA and other entities. I support the preferred alternative and offer the above suggestions for your consideration.

Jerry Hamilton

JERRY S. HAMILTON
Environmental Coordinator
Formation Capital Corporation, US

Page 1 of 1

5.1 Restoration will be accomplished with native species except where specific circumstances (availability, cost, etc.) prohibit their use. If non-native species must be used in order to meet site objectives, species will be selected with characteristics similar to the native plant community. See Section 2.C.3 of the FEIS.

5.2 These suggested endeavors are beyond the scope of this FEIS.

5.3 Your suggestion for defined Desired Future Condition (DFC) goal statements is noted. Goal statements are described for each alternative in Section 2.D.2 and on Table 2-6 of the FEIS and describe DFC in relation to weed treatments.

January 7, 2003

William Diage, Planning Team, Ecologist
USDA Forest Service
50 Highway 93 South
Salmon, Idaho 83467

Dear Mr. Diage,

I would like to go on record as being very supportive of the 'Proposed Action' plan to combat invasive weeds on the Salmon-Challis National Forest. Because of the difficult terrain and the vast number of acres to manage, one must use all the weapons available if we are going to win the war against weeds. The low potential for harmful effects from herbicide use, and the high potential for noxious weed spread by choosing any other alternative makes this an obvious choice.

6.1 There appears to be an incomplete statement on page 1-6, 2nd paragraph in I.C.4 "Annual rates of spread have been estimated at more than 5000 acres throughout the western states". In reality, noxious weeds throughout the western rangelands are spreading at the rate of 4500 *acres/day*. Am I reading this wrong?

Good luck in this endeavor!

Michael Overacker
Michael Overacker
Lemhi County Weed Superintendent
201 Broadway St.
Salmon, ID. 83467

6.1 The referenced text has been corrected and revised in the FEIS.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 356
Portland, Oregon 97232-2036

Salmon — Challis National Forest
JAN 13 2003
RECEIVED

IN REPLY REFER TO:

January 7, 2003

ER 02/1082

Mr. Lyle Powers
Salmon-Challis National Forest
Noxious Weeds EIS
50 Highway 93 South
Salmon, Idaho 83467

Dear Mr. Powers:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for the Salmon-Challis National Forest (SCNF) Weed Management Program, Salmon Challis National Forest, Idaho. We offer the following comments for your consideration and use in the preparation of the Final Environmental Impact Statement (FEIS).

General Comments

Fish and Wildlife Resources

It appears based on the information provided in the DEIS that Alternative 1 would be most protective of fish and wildlife resources. With the inclusion of aerial herbicide application, as is intended in the current Proposed Action, the risk for herbicides to reach surface waters or non-target riparian vegetation, is increased and would therefore, result in greater effects to fish and wildlife resources. The Department recommends implementation of Alternative 1, instead of the Proposed Action.

Endangered Species

7.1 The "no disturbance zone" for bald eagles should be increased to ½-mile per the guidelines outlined in the Bald Eagle Management Plan for Greater Yellowstone (1996), as opposed to 1/8-mile as suggested in the DEIS, in order to minimize disturbance to nesting bald eagles. In the guidelines for management of breeding areas (within the management plan referenced above), nest sites are divided into three different management zones. Zone I includes the nest site area and extends in a 400 m (1/4-mile) radius around the nest. Zone II is the primary use area and occupies an 800-m (½- mile) radius around the nest. Zone III includes all foraging habitat within a 4-km (2 ½- mile) radius of the nest.

7.2 Areas near occupied bald eagle nests should be surveyed to determine whether planned aerial spraying would occur within Zone I or Zone II of nest sites. If so, we recommend management actions for the bald eagle nests follow the guidelines outlined in the Bald Eagle Management Plan for Greater Yellowstone (Plan), particularly with regard to use of aircraft below 600 meters above

7.1 The S-CNF and the Central Idaho Mountains are covered by the Pacific Bald Eagle Recovery Plan (USFWS 1986). The 1/8-mile buffer was obtained from the Salmon Land and Resource Management Plan (LRMP) prior to bald eagle nests being established on the Forest. In recent years, bald eagle nesting sites have been established and identified. With the discovery of the nesting sites, the Forest LRMP extends the buffer to 1/2 mile during nesting (March through August). The specific mitigation measures in the FEIS have been revised to reflect this strategy.

7.2 The disturbance mitigation strategies in the FEIS follow direction contained in the S-CNF LRMPs and Pacific Bald Eagle Recovery Plan.

ground level. Critical nesting periods vary throughout the bald eagle recovery area, but generally fall between March 1st and August 31st. Human activity, including aerial spraying, should not exceed "minimal levels" as defined in the plan (i.e., no human activity with the exception of existing patterns of ranching and agricultural activities, nesting surveys and banding studies by experienced biologists, or river traffic that continues at a rate equivalent to the main current) in Zone 1, and "light levels" (i.e., day use and low impact activities such as boating, fishing and hiking at low densities and frequencies; excluded activities include extended use and activities such as heavy construction, timber harvest, and helicopter or jets within 600 m of the ground) in Zone II during the period from first occupancy of the nest site until two weeks following fledging. Habitat alterations should be restricted to projects specifically designed for maintaining or enhancing bald eagle habitat and conducted only during September through January. Human activity restrictions for Zone 1 may be relaxed during years when a nest is not occupied but should not exceed light levels.

7.3 Also, noxious weed management should be carefully designed and regulated to insure preferred nesting habitat characteristics and foraging habitat are not degraded as a result of the spraying activities.

Herbicide Selection

7.4 The herbicide picloram has a moderate-high persistence in the soil (Wauchope et al. 1992); therefore, it may not be necessary to apply on an annual basis. Additionally, 2, 4-D has been identified as an endocrine disrupting compound. We recommend the SCNF Weed Management Program incorporate this in the analysis of impacts and consider this when choosing the treatment method.

7.5 No mention is made in the DEIS of the use of surfactants during herbicide application. If the use of surfactants is anticipated, we suggest a discussion be added regarding the types of surfactants that will be used; how they will be managed (i.e., use rate, distances from water they will be applied, etc.); and the potential effects to fish and wildlife resources, including federally-listed species and migratory birds.

Specific Comments

Section 2.D.3.a. Management Practices and Mitigation Measures Common to All Alternatives: As stated in the DEIS, a ½-mile radius "no disturbance zone" will be implemented during the nesting season for great gray owls, northern goshawk, Coopers' Hawk, and sharp-shinned hawk nesting sites. Additionally, ½-mile "no disturbance zone" will be implemented around all other raptor nests, including bald eagles. No similar management practices were discussed for sensitive

7.6 ground-nesting birds such as sage grouse (*Centrocercus urophasianus*) or Columbian sharp-tailed grouse (*Tympanuchus phasianellus*). We recommend the SCNF consider similar management and mitigation measures for these species.

Section 2.D.3.b., bullet 14 Herbicide Spraying Adjacent to Surface Water: states that no spraying of picloram would occur within 100 feet of surface water when wind velocity exceeds 5 mph; however, Section 4.B.2.b. (page 4-29) states there will be no spraying of herbicides... within 50

7.7 cont. feet of open water when wind velocity exceeds 5 mph. This should be clarified in the FEIS. Additionally, it would be useful to include a table in the FEIS that contains the potential herbicides to be used, along with the guidelines that will be followed for each herbicide (i.e., spray

7.3 With the application of buffers and other mitigation measures described in Section 2.D.3 of the FEIS, no significant impacts on bald eagles are anticipated under the Proposed Action. Section 4.B.3 and Table 4-2 discuss the potential impacts of noxious weed treatments for each of the wildlife source habitats and associated families and groups by treatment strategy. Source habitat for bald eagles is included in family 7, group 26. As shown in Table 4-2, only Alternative 2 would not result in moderate to high long-term habitat benefits for bald eagles

7.4 The FEIS has been revised to expand the discussion of picloram and 2, 4-D characteristics and potential effects, including their potential for endocrine disruption. A one application per year limitation for picloram has been included as a best management practice. Sections 2.C.1.d and 4.B.3 include a discussion of herbicide characteristics, with added emphasis on the potential effects of herbicides on endocrine disruption.

7.5 Surfactants, with other "inert" ingredients, are added to herbicides to enhance the performance of active ingredients. Sometimes surfactants and other "inert" ingredients are added to herbicides as part of a proprietary blend. During application of some herbicides, surfactants can be added in small quantities to ensure effective application of the herbicide. The text in Section 2.C.1.d of the FEIS has been revised to include a discussion of inert ingredients and their effect on the environment. The BMPs identified in the FEIS for herbicide use were developed to avoid or minimize the potential effects to terrestrial and aquatic environments.

7.6 According to the most recent information available, no active nesting or brood rearing sage grouse sites have been identified on the S-CNF, nor is there any incidence of Columbia sharp-tailed grouse. The site-specific implementation process (Section 2.C.6 of the FEIS) was designed to assess the presence of sensitive resources and avoid adverse effects at the site-specific level.

7.7 The narrative is clear that picloram has specific buffer criteria different than the other herbicides. Comparison tables, similar to those suggested in your comment, have been included in Appendix J of the FEIS. These tables provide additional information on the toxicology profiles of herbicides used or proposed for use on the S-CNF; typical and maximum application rates, aquatic assessment levels of concern, and risk quotients for these herbicides; and buffer widths and associated restrictions on herbicide application.

7.7 cont. distance from water depending on wind velocity, buffer zones for each herbicide for sensitive areas, etc.).

7.8 Section 3.C.2.b. Special Status Species; Federally Listed Fish: The DEIS states that critical habitat has not been designated for bull trout. However, proposed critical habitat for bull trout was released on November 29, 2002 (67 FR 71235). The area proposed for noxious weed treatment lies within recovery unit 16 (Salmon River Basin); which encompasses an area of 36,278 square kilometers (14,000 square miles), including 28,730 kilometers (17,000 miles) of streams. This new information should be included in the FEIS.

7.9 Section 3.C.3.b. Yellow-billed Cuckoo, page 3-48: The documents reference a 1985 paper by Reese and Melquist, to support the position that breeding populations of yellow-billed cuckoos (YBC) in Idaho are likely extirpated. The 1998 Forest Service publication titled "Effects of Recreational Activity and Livestock Grazing on Habitat Use by Breeding Birds in Cottonwood Forests along the South Fork Snake River" documents the presence of nesting YBCs in the cottonwood galleries of the South Fork Snake River during the study period 1991-1994. Further, David Reeder, biologist for the Yankee Fork Ranger District, reports occurrences of YBCs in the cottonwood galleries within his District. YBC's have recently been reported to occur in other areas of Idaho, including Fort Hall and Camas National Wildlife Refuge. This should be clarified in the FEIS.

7.10 Section 4.B.3.c: Under Alternative 1, the DEIS states that the "direct and indirect benefits to wildlife (under Alternative 1) would generally be similar to those described for the Proposed Action, but somewhat less pronounced or widespread...." However, Table 4-3 lists the relative threats and benefits of the Proposed and Alternative actions on wildlife habitats. According to the Table, for the Proposed action, the long-term effects on habitat for all wildlife considered is anticipated to be a "threat", while for Alternative 1, the long-term effects on habitat are all expected to be a "benefit". Therefore, according to Table 4-3, the "direct and indirect benefits to wildlife" do not appear to be similar for the Proposed Action and Alternative 1 as stated in the DEIS. This should be clarified in the FEIS.

Thank you for the opportunity to comment on this document. If you have any questions or require addition information regarding these comments, please contact Sandi Arena in the Fish and Wildlife Eastern Idaho Office, Chubbuck, Idaho, at 208-237-6975, extension 34. If I can be of any assistance please contact me at (503) 231-6157.

Sincerely,

Preston A. Sleeger
Regional Environmental Officer

7.8 The FEIS text has been revised as suggested. See Section 3.C.2.b.

7.9 The discussion of yellow-billed cuckoo in Section 3.C.3.b of the FEIS has been clarified. The Reeder report referred to in this comment was made in 1998 regarding a sighting of a single adult in mature cottonwood/willow communities. This sighting was on private land well outside the Forest boundary along the main Salmon River, southeast of Challis, Idaho. No evidence of additional sightings has been reported.

7.10 Table 4-2 has been revised in the FEIS to provide clarity between the table and the narrative.

----- E-mail Comment.
****
William B. Diage
Ecologist, Planning Team
Salmon-Challis National Forest
(208) 756-5562 FAX (208) 756-5555
e-mail: wdiage@fs.fed.us
****
----- Forwarded by William B Diage/R4/USDAFS on 01/15/2003 09:11 AM -----

RODGERLS@cs.com
01/13/2003 03:16 PM

To: wdiage@fs.fed.us
cc:
Subject: Final EIS Salmon-Challis National Forest Noxious Weed Management Program

13Jan, 2003

William B Diage, Planning Team, Ecologist
USDA Forest Service
50 Highway 93 South
Salmon, ID 83467

Mr. Diage:

As an owner of property bordering US Forest lands and as a frequent visitor to some of the more remote areas of the Salmon-Challis National Forest, I have a very strong desire to have our noxious weed infestations significantly reduced. I am urging the use of all available means to attack the continued proliferation of these invaders. My experience in weed management has proven that multiple applications of herbicide coupled with mechanical means and biological use followed by constant surveillance and reapplication where necessary is the best way to slow the damage these weeds are doing.
8.1 As you prepare the Final EIS, I urge you to make forest lands accessible so the weed-infested areas may be treated economically and effectively with the PROPOSED ACTION alternative. Another suggestion is to use volunteers, where possible, in the identification, treatment, and surveillance of problem areas.

Thank you,

Rodger L Sorensen
245 N Hooper Ave
Soda Springs, ID 83276

8.1 Your suggestion is noted.

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

The Ecology Center, Inc.
801 Sherwood Street, Suite B
Missoula, MT 59802
(406) 728-5733
(406) 728-9432 fax
ecocenter@wildrockies.org

January 13, 2003

Forest Supervisor
Salmon-Challis NF-FS-USDA
50 Hwy. 93 South
Salmon, ID 83467

To Whom This Concerns:
I am taking the opportunity to comment on the Draft EIS for the Salmon-Challis NF Noxious Weed Treatment proposal, on behalf of The Ecology Center, Inc. (TECI).

9.1 The course of action proposed in the DEIS, with the proposed action or alternative 1, to some degree, represents a continuation of unthinking "spray and spray some more" management with little real regard for stemming the increasing infestation and spread of noxious weeds in the SCNF. The FS never genuinely looks at the root cause of invasive species introduction or spread. For example, we know that invasive species are favored by soil disturbance and bare ground. We also know that areas susceptible to weed invasion include burned sites, early successional communities dominated by annual vegetation, river and stream banks, trail corridors, roadsides, building and recreational sites, and heavily grazed areas. As we stated in our scoping comments:

> In our view the only option that makes sense is to do what is necessary to reduce current populations while taking extreme caution to avoid water and soil contamination while simultaneously identifying the main sources of weed spread and eliminating them so that you never have to use the toxic chemicals again.

In response, the FS states at DEIS 2-48 that consideration of these issues and proactive methods is beyond the scope of this document.

The SCNF's response makes no sense. The stated Purpose and Need for this project includes:
- Eliminate new invaders (weed species not previously reported in an area) before they become established,
- Contain or reduce known and potential weed seed sources throughout the SCNF,
- Prevent or limit spread of established weeds into areas containing little or no infestation. (DEIS ES-1).

9.2 The stated Purpose and Need would be well-served by limiting the type of management activities that facilitate the spread of noxious weeds. Is the Forest Service really unable to manage the forest without building or reconstructing more roads, and with less soil disturbance? What are the environmental and economic trade-offs of some level of reduction of soil disturbance? Of the points included in the Purpose and Need, most are directly responded to by considering reducing or stopping new roads and logging until the noxious weed problem is brought under control on the NF. The SCNF claims that the proposed project is an <u>integrated</u> approach to noxious weed management, yet is not willing to consider a moratorium on logging and road building activities in vulnerable areas, which would be a very <u>integral</u>—indeed the most effective way there is of limiting spread of noxious weeds!

9.3 Fires and other activities will have cumulative effects that are undoubtedly present or will recur on the Northern Rockies forests of the SCNF; cumulative effects in existing and potential burned areas should have been addressed in this analysis. The introduction of noxious weeds into burned areas would not be an issue if human vectors had not transferred noxious weed seeds into the vicinity of burned areas. While the noxious weed seeds spread by crews and equipment during fire suppression activities may enable noxious weed spread through some of the burned area, their effects were likely localized. Roads in the vicinity of the burned areas likely have the greatest potential for spreading noxious weed seeds. These roads should be considered for temporary closure or, optimally, for obliteration. Road closure and obliteration is justified given that the roads also pose the potential to erode fragile post fire soils. Roads within the project area should be carefully mapped.

9.1 The DEIS recognized and discussed the root causes of weed spread and incorporated the principles and concepts of integrated weed management in all alternatives (see Section 1.A.1). The FEIS contains these same discussions. See also Response 2.1.

9.2 See Response 2.1.

9.3 See Response 2.1. Fire is recognized as a disturbance, the effects of which greatly enhance the risk of weed expansion and establishment. Public access and uses compound this risk. Post-fire road closures may be initiated from actions described in Burn Area Emergency Plans. Road inventories have been performed on the Forest and are displayed on the Challis National Forest Travel Map and the Salmon National Forest Travel Map, readily available to the public.

9.4 One purpose of the project is to comply with presidential executive orders (DEIS ES-1). This includes Executive Order 13112. How is the proposal consistent with the following sections of Executive Order 13112?

> Section 5: (b) The first edition of the Management Plan shall include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways, and shall identify research needs and recommend measures to minimize the risk that introductions will occur. Such recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species.

Or,

> Sec. 2. Federal Agency Duties. (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,
>
> (1) identify such actions;
>
> (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and
>
> (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

9.5 Roads appear to play a role in the known occurrences of noxious weeds (DEIS Map 3-1) and may play a further role in the presence of yet uninventoried infestations that are out there. We challenge the FS to give an accurate percentage of the miles of roads on the SCNF that have never had noxious weeds. Likewise, these infestations on the roads readily expand into cutting units, especially the more intensive the logging done in the particular units. The FS just throws up its hands and accepts that they will be carrying out management activities that inevitably cause more spread of weeds, disingenuously calling the present DEIS ■ "prevention" strategy!

The premier tool of prevention of new noxious weed invaders deserves the highest priority. Instead, all prevention strategies assume weeds will invade, then prescribe expensive control methods of unknown efficacy after the fact.

9.4 The concepts of integrated weed management, described in Section 1.A.1 of the FEIS are consistent with Executive Order 13112. Section 2 of the Order refers to Forest actions that are addressed in Response 2.1.

9.5 There are few available data to identify roads that have "never" had noxious weeds.

Without first significantly reducing the type of soil disturbing activities that facilitate noxious weed invasion, the proposed treatment effects may be negated, indeed, overwhelmed by the spread of weeds caused by more of the same road building and logging. By arbitrarily limiting the scope, the FS has failed to show a genuine, pressing need to risk the ecosystems by applying poisons.

Under the NEPA regulations at 40 CFR § 1501.7 ("Scoping"), it states:

> There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping. . . .
> (a) As part of the scoping process
> the lead agency shall:
> (2) Determine the scope (§ 1508.25) and the significant issues to be analyzed in depth in the environmental impact statement.

9.6 Despite public comment and the obvious source of most of the problem, the DEIS avoids the issue. Nowhere does the analysis evaluate the effectiveness of limiting new developments on the Forest in meeting a large part of the Purpose and Need—preventing the spread of noxious weeds.

Interestingly, the DEIS identifies "cultural control" and site "restoration" as one method available for noxious weed control. Cultural control generally involves manipulating a site to increase the competitive advantage of desirable species and decrease the competitive advantage of undesirable species (DEIS 2-8&9; 2-18&19). The DEIS entirely
9.7 fails to take into account that management activities such as logging, road construction, mining, and livestock grazing are a reverse "cultural control." They decrease the competitive advantage of desirable species and increase the competitive advantage of undesirable species. In effect, the SCNF is busily instituting noxious weed encouragement projects over thousands of acres of national forest land annually, resulting in noxious weed invasions the present weed control project is designed to do battle with!

9.8 The DEIS fails to meet NEPA's requirements that a reasonable range of alternatives be fully analyzed. The Forest Service Handbook, chapter 20, section 23.2 states that the purpose and intent of alternatives are to "ensure that the range of alternatives does not foreclose prematurely any option that might protect, restore and enhance the environment." Under NEPA, an environmental impact statement must contain a discussion of "alternatives to the proposed action" [42 U.S.C. 4332(2)(D)]. As interpreted by binding regulations of the CEQ, an environmental impact statement must "(r)igorously explore and objectively evaluate all reasonable alternatives" [40 C.F.R. 1502.14(a)]. The importance of this mandate cannot be downplayed; under NEPA, a rigorous review of alternatives is "the heart of the environmental impact statement." 40 C.F.R. 1502.14. Similarly, case law has established that consideration of alternatives which lead to similar results is not sufficient to meet the intent of NEPA. [Citizens for Environmental Quality v. United States, 731 F.Supp. 970, 989 (D.Colo. 1989); State of California v. Block, 690 F.2d 753 (9th Cir. 1982).]

NEPA regulations at 40 CFR § 1502.4(a) state:

> Agencies shall make sure the proposal which is the subject of an environmental impact statement is properly defined.

And at 40 CFR § 1508.25, NEPA regulations state:

> Scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. . . To determine the scope of environmental impact statements, agencies shall consider:
> (a) Actions (other than unconnected single actions) which may be:
> (1) Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:
> (i) Automatically trigger other actions which may require environmental impact statements.

9.9 cont. In considering these clauses straight from NEPA, it is clear that the impacts of various land disturbing actions that the SCNF carries on, (impacts which include creating the conditions for further spread of noxious weeds) are fully

9.6 Results of public scoping and the analysis of public comments are presented in Sections 2.B.2, 2.B.3, and 2.B.4. There was a wide range of comments (from elimination to expansion) regarding Forest uses. See also Responses 9.1 and 2.1.

9.7 Your opinion is noted.

9.8 A full range of alternatives was identified and considered. Several of those considered were eliminated from detailed analysis for the reasons described in Section 2.E. See also Response 2.1.

9.9 Many authorized Forest-use allocations are connected actions in regards to potential land disturbances and potential noxious and invasive non-native species invasion. These uses are subject to NEPA review, and identify specific weed prevention and establishment mitigation measures, BMPs, and SOPs. The Forest does not consider these use allocations to be connected to Forest-wide treatment actions in the control or eradication of established weed infestations.

9.9 cont. "connected" in the NEPA sense. Thus, the decision of the FS to limit the scope of the EIS to exclude the weed-spreading nature of those other land disturbing activities is illegal.

9.10 With the selection of action alternatives such as the proposed alternative or alternative 1, a lot of follow-up will be necessary. And at what cost, environmentally and economically? At what cost without addressing the fundamental causes of weed infestation and weed spread? At what cost if the fundamental causes of weed infestation and weed spread are addressed? The DEIS fails to take those issues on, although it is clear that more actions, with their resulting environmental and economic effects, must be undertaken.

9.11 The decisionmaker and concerned public do not have the needed information to determine how alternatives maximize long-term net public benefits. The DEIS does not include a complete economic analysis.

The DEIS fails to take into account the estimated costs of follow-up control actions, and the costs of control in the unspecified areas mentioned (areas discovered in future surveys) within the DEIS. The full costs of these actions are decidedly not anticipated. The DEIS is a huge failure in NEPA compliance with such a cursory treatment of the economics of the situation.

In the process of formulating and evaluating the effects of implementing the Forest Plan for the SCNF, the vast environmental impacts of noxious weed invasions resulting from the kind of development actions contemplated was vastly underestimated. That is evident from the failure of the previous weed control actions, and the levels of infestation described in this DEIS. The overwhelming majority of actions outlined in the Forest Plan involve ground disturbing actions which result in providing prime sites for noxious weed invasion. The *Integrated Scientific Assessment* from the Interior Columbia Basin Ecosystem Management Project recognizes the seriousness of the noxious weed problem in the region.

9.12 Noxious weeds are such a grave problem on the SCNF that what is called for is a formal Forest Plan Amendment process. It is typical of an agency obsessed with extraction of resources as its prime focus to propose a short-term, stop-gap, and possibly ineffective measure as evidenced by the DEIS's proposal.

The chemical herbicides proposed pose health risks to workers and the general public, create unknown risks to animals, plants, and other components of the ecosystems (as stating in our scoping comments), require uncertain levels of follow-up treatments (both with more herbicides and non-chemical means), and are of unknown effectiveness.

9.13 Even though herbicides can have widely varying impacts on organisms across species, families and taxonomic groups, the DEIS does not acknowledge this and the DEIS does not disclose that there could be serious unknown impacts to various TES species, MISs and biological communities across the project area.

9.14 Follow-up is critical for many of the weed species, yet follow-up treatment is given little attention—the costs are considered negligible in this DEIS. Research on weed management, and in-the-field experience have not been considered.

It is also clear that the proposal is really a programmatic plan for the SCNF, as it provides for noxious weed control actions on the NF beyond those specific locations mentioned in the DEIS. The DEIS states on page 1-15 "The period of weed treatment treatment under the Proposed Action would continue until a change in weed conditions on the SCNF becomes evident, consistent with proposed weed management goals." "The expected time frames and goals for accomplishing the Proposed Action management objective would vary depending on the extent and severity of weed infestations" (DEIS 2-37). "An adaptive weed management would be used to determine appropriate future treatments on the SCNF if new weed infestations are discovered or existing infestations expand" (DEIS 2-19). There is no information on how long this open-ended venture will last, for the proposed action or the other alternatives.

Since this DEIS proposes additional activities on unspecified sites, this needs to be dealt with at the Forest Plan Decision/Amendment level rather than at the project level.

9.10 Follow-up monitoring and treatment effectiveness are addressed in Section 2.C.3 of the FEIS. Cost comparisons of the alternatives are also discussed and displayed in Tables 2-5 and 2-6 of the FEIS.

9.11 Economic analysis is adequately discussed in Section 4.D.4 and Tables 2-5, 2-6, and 4-8 of the FEIS. Cost comparisons among the alternatives are based on costs per acre. The nature of the treatment (i.e., initial, follow-up, new site, etc.) is not considered.

9.12 As discussed in Section 2.E of the FEIS, a Forest Plan Revision is a more appropriate avenue for addressing Forest use allocations. See also Response 2.1.

9.13 A thorough analysis is presented in Chapter 4 of the FEIS.

9.14 See Response 9.11. Cost comparisons among alternatives are based on costs per acre whether initial or follow-up treatments.

In addition, weed control efforts beyond those specified may not be treated due to uncertainties of funding according to the DEIS. This further reveals the incomplete, stopgap characteristic of this proposal. Nobody really knows how much needed control, based on later surveys, will actually be carried out. This is more reason why noxious weeds should be dealt with using a Forest Plan Amendment.

9.15 The DEIS maps and lists invasive species infestations (DEIS Map 3-1 and Appx B). What methods were used? Are these methods accurate and complete and likely to identify all areas of infestation?

9.16 The EIS should propose a detailed monitoring plan. The monitoring proposed in the EIS lacks specifics. How soon after treatment would monitoring take place? How thoroughly? The monitoring plan should assess weed levels as well as evaluating any detrimental ecological impacts of the application of poisons to ecosystems.

This is a major omission from the DEIS. How will anyone know, in the future, what control actions would be safe and effective without the district committing to a systematic way of gathering data and feedback from the project, and providing a written report of that monitoring? No fully informed decision about future treatment plans could be made.

9.17 The DEIS is rife with uncertainties and incomplete information on the dangers of herbicides. Much of our concern about the proposal is grounded firmly in the knowledge that previously unknown dangers became evident when uninformed decisions have been made. The case study of the use of DDT and its effects on bird shells is one of perhaps thousands of examples. Furthermore, in this DEIS many dangers are mentioned. Also:

> Picloram is a relatively mobile, persistent, and toxic herbicide...(DEIS 4-25)

9.18 And while this EIS is relatively short on the potential dangers of herbicide use, the DEIS for the Noxious Weed program for the Bitterroot NF next door found that:

> Picloram can stay active in soil for relatively long periods of time, maintaining toxicity to plants for up to a year (BNF DEIS 4-20).
>
> Picloram generally affects members of the Asteraceae (composite), Fabaceae (legume), Polygonaceae (buckwheat), and Apiaceae (parsley) families... (BNF DEIS 4-16).
>
> ...there have been some concerns that HCB [hexacholorobenzene, a byproduct of picloram] is carcinogenic (BNF DEIS 4-21)
>
> 2,4-D ... in its butyl ester form [is]... moderately toxic to birds (BNF DEIS 4-21).
>
> 2,4-D ... can kill or injure many broadleaf plants (BNF DEIS 4-16).
>
> Sudies in rats showed 2,4-D, was not cancer causing, though liver damage was seen at relatively low doses. Pregnant rats showed no evidence of birth defects, though fetuses showed evidence of toxic effects (BNF DEIS 4-21).
>
> 2,4-D can bioaccumulate in animals. Residues have been reported in milk, eggs, and meat products (BNF DEIS 4-21).
>
> [S]ensitivity [to 2,4-D] varies greatly between animal groups (BNF DEIS 4-21).
>
> Dicamba is slightly toxic to mammals... (BNF DEIS 4-22).
>
> Dicamba... is effective on plants in the Asteraceae (composite) and Fabaceae (legume) families (BNF DEIS 4-16).

9.15 A formal field survey/inventory procedure has been developed using data dictionaries with GPS units. Where inventories were performed, the data are complete and accurate.

9.16 The monitoring discussion in Section 2.C.3 of the FEIS has been revised to outline specific monitoring requirements.

9.17 Your opinion is noted. Research described in the FEIS describes current research regarding toxicity of herbicides. Since toxicity is a function of dosage and exposure, the Forest identifies the methods and handling procedures to be employed in using herbicides to control weeds so that dosage and exposure are minimized and that herbicide use occurs in as safe a manner as possible.

9.18 Your opinion is noted.

The manufacturing process of dicamba has the potential to result in trace amounts of 2,7-dichlorobenzo-p-dioxin as a contaminant (BNF DEIS 4-22).

Metsulphuron methyl is water soluble and remains in the soil unchanged for varying lengths of time, depending on soil type and moisture availability. The half-life can range from 120 to 180 days (BNF DEIS 4-22).

Metsulphuron (Escort) is ... used to control plants in the mustard or borage families (BNF DEIS 4-17),

The half-life [of clopyralid methyl] can range from 15 to 287 days depending on soil content and climatic conditions (Infoventures 1995e) (BNF DEIS 4-22).

Clopyralid... affects members of four plant families: Asteraceae, Fabaceae, Solanaceae (nightshade), and Polygonaceae (Dow AgroSciences 1997) (BNF DEIS 4-16).

Affect of the herbicide [imazapic] on perennial grasses and other broadleaf weeds can vary greatly Within a plant family (BNF DEIS 4-16).

Estimated exposures [for imazapic] exceed high risk only under extreme assumptions for one species, the longtail vole, during the use of 2,4-D and dicamba (BNF DEIS 4-23).

Of all groups of wildlife species, amphibians are potentially the most sensitive to herbicides because of their complex life cycle; almost all species require moisture of some form of water to complete their life cycle, and most are aquatic in their egg or larval stages (BNF DEIS 4-23).

Sub-lethal concentrations of some contaminants may increase susceptibility of [amphibian] larvae to disease, increase predation of larvae by impacting swimming ability, or by retarding growth rates (BNF DEIS 4-23)

Picloram (Tordon 22K) applied at rates greater than 1 1/2 pints per acre would have the greatest impact on non-target vegetation species, though this treatment is only proposed for small areas infested with ... goatweed and leafy spurge (BNF DEIS 4-24).

The list shows that a large number of roadside treatment stream crossings would occur for the Proposed Action... (BNF DEIS 4-9).

[underlining for emphasis]

9.19 The FS claims "no synergistic effects from herbicide application would occur" (DEIS 4-30)? How does the FS know that this or other herbicides do not have synergistic effects? How many combinations of herbicides have been tested? How does the FS know that combinations of new, as-of-yet unapproved herbicides will not have synergistic effects when they are introduced and applied?

The herbicides proposed here would impact a broad range of plant and animal species (including humans). There are other uncertainties concerning safety. In a letter from Dr. John D. Graham, Director, Program on Risk Analysis and Environmental Health, Harvard University School of Public Health included in the NEPA analysis for another project in Region One, the Priest Lake Noxious Weed Control Project FEIS, pp. C-1 and 2:

> The results of two studies ... suggest an association between the occupational use of 2, 4-D and non-Hodgkin's lymphoma.

9.19 These conclusions are derived from Environmental Protection Agency (EPA) models discussed in Section 4.B.2.b in Chapter 4 of the FEIS, which will apply to new or updated chemicals as well. The models indicated the effects of mixing chemicals were additive but not synergistic. As noted in Section 2.C.1.d in Chapter 2, new or updated chemicals: 1) will be required to comply with EPA regulations; 2) must be added to the Forest Service's list of approved chemicals; and 3) will be accompanied by risk assessments.

As a means of resolving these issues, workshop participants stressed the need for future studies to develop more reliable and precise estimates of 2, 4-D exposure and to distinguish more clearly between 2, 4-D and other agents in the collection and analysis of data and the reporting of results.

Also:

The single canine epidemiologic study suggested that pet dogs may be at risk from exposure to 2, 4-D or to areas treated by lawn care service. Although this study is supportive of a finding of carcinogenicity, there are questions about its applicability to human carcinogenicity because of poor information on exposure and possible non-comparability between canine and human lymphomas. (Science Advisory Board, EA at C-3).

9.20 This DEIS mentions that in some cases a mixture of herbicides will be used, yet dismisses the unique dangers mixtures inherently include, without any solid exploration of the issue.

9.21 The discussion of the dangers herbicides present to humans is entirely too brief. Little or no results of research are presented.

NEPA Regulations have important provisions for dealing with "Incomplete or unavailable information." At 40 CFR § 1502.22, it states:

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
(1) A statement that such information is incomplete or unavailable;
(2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
(3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and
(4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

9.22 We also point out that the DEIS does not disclose the credentials and expertise of the members of the ID Team in dealing with herbicides and their effects. Are there individuals with solid credentials for determining the potential effects of using chemical herbicides as prescribed in the DEIS on the ID Team?

9.23 Disclosure of uncertainty is particularly importantly important with regards to biological control agents. Biological control agents pose a substantial risk associated with the potential to switch host plants or compete with other herbivorous insects. The degree of research and current knowledge level associated with the proposed biological control organisms should be thoroughly disclosed.

9.24 Additionally, the EIS Interdisciplinary team must include someone with a thorough knowledge of the potential toxicity of herbicides. At 40 CFR fl 1502.6, it states:

Environmental impact statements shall be prepared using an inter-disciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts (section 102(2)(A) of the Act). <u>The disciplines of the preparers shall be appropriate to the scope and issues identified in the scoping process (fl 1501.7).</u> (Emphasis added).

9.20 See Response 9.19.

9.21 A full analysis of human health and safety is provided in Section 4.D.1 of the FEIS and fully referenced in Chapter 9. The FEIS also discloses the status of information and research that has been conducted on the herbicides proposed for use. Uncertainties concerning potential effects of herbicide use are addressed through use of mitigation, BMPs, SOPs, and monitoring to further reduce potential impacts associated with herbicide use.

9.22 Chapter 8 describes the credentials of the ID team. The team's experience in preparing NEPA documents, across a wide range of scientific disciplines, provides more than adequate credentials for preparing this EIS.

9.23 Biological controls are discussed in Section 2.C.1.b of the FEIS. As noted, they will not be applied without APHIS approval. Appendix C identifies the list of biological controls approved for use.

9.24 See Response 9.22.

9.25 What particular expertise and knowledge does the ID Team and decisionmaker have? Who is CH2M Hill, why were they selected to prepare the EIS, and what are their biases? Will the ID Team and decisionmaker simply sign off on the EIS/ROD or will they critically examine these documents or the assumptions made?

We prefer manual control over chemical control because we feel that as few chemicals as possible should be injected into the ecosystem. Even if they have been shown to be relatively harmless to other plants and animals, we feel that there is too much that we don't know about ecosystems to be so certain. Many of the adverse impacts the Forest Service may be causing have not been investigated, and likely will never be investigated for herbicide formulations and combinations of herbicides and other stresses.

> For instance, numerous chemicals are being found to affect any of numerous elements of endocrine, or hormone systems, of wildlife and humans. This can compromise development, reproduction, behavior, sexual integrity, and immune and nervous system functioning. The
>
> 9.26 association in several dozen epidemiological studies of phenoxy herbicides such as 2,4-D with cancer, for instance, as well as the association of 2,4-D with birth defects, may be related to action of 2,4-D on the endocrine system.
>
> A so-called "inert" ingredient in Banvel CST (active ingredient: dicamba), which is used in Region 6, is ethylene glycol, which has caused birth defects and a decrease in male fertility in laboratory animals. The decrease in male fertility was not reported in the Region's information profile on dicamba formulations, including the inert ingredient, ethylene glycol. Ethylene glycol appears to be an endocrine disruptor.
>
> Chemicals that differ widely in molecular structure are involved in endocrine disruption, such that any given component of an herbicide formulation may be an endocrine disruptor and you could not know that unless it has been tested for various mechanisms of endocrine disruption such as mimicking estrogen or blocking testosterone. Most herbicide formulations have not been tested for any mechanisms of endocrine disruption and likely will never be tested. (O'Brien 1997).

9.27 There is too little site specific analysis. The effects of chemical herbicides on plants, animals, and humans should be thoroughly considered. Any waterbodies in the project area should be thoroughly mapped. Given the potential for herbicide chemicals to be dissolved in water, the EIS must thoroughly discuss the aquatic ecosystems, including fish presence. The presence of any threatened, endangered, or sensitive species in the project area and project effects on these species must be carefully analyzed. We are concerned with the possibility of herbicide chemicals bioacumulating in big game species using the winter range.

9.28 The potential for herbicide chemicals to be absorbed into soil particles must also be thoroughly analyzed.

9.29 Cumulative effects in the project area should be disclosed.

9.30 A thorough economic analysis must be central to the EIS. Losses in ecosystem integrity (including species, ability to provide ecosystem services, and levels of biodiversity in the project area) should have been incorporated in the economic analysis. Future costs of noxious weed management should be considered.

9.31 What data is there on TES and MIS wildlife, aquatic and plant species populations, population trends or habitat? Do you plan to go forward with herbicide treatments regardless of data on declining population trends, near minimum viable populations, or below-minimum viable populations of plant/wildlife/aquatic species populations? Do you plan to go forward with herbicide treatments even if there is a lack of data on population viability of MIS/TES plant/wildlife/aquatic species populations, and lacking data on potential impacts to specific populations?

9.32 The FS says that prevention, information, and education programs would take place under all alternatives developed for this project (DEIS 2-27&28). What specific programs are planned and how will they be implemented? Are they effective?

9.25 See Response 9.22.

9.26 Your preference is noted. The FEIS acknowledges data are often incomplete or lacking, especially in regards to proprietary inert ingredients. Sections 2.C.1.d, 4.B.2, 4.B.3, and 4.D.1 of the FEIS have been revised to expand on the characteristics and effects of inert ingredients and potential endocrine-disrupting herbicides. See also Responses 7.4 and 7.5.

9.27 Each of the potentially affected resources has been identified, described, and thoroughly analyzed. Site-specific impacts are described for representative locations and species. For example, site-specific analyses under a variety of environmental conditions (physical and biological) and representative species groups, along with extensive reviews of representative herbicides, are fully discussed throughout Chapter 4, and Appendices F, H, I, J, and L. The site-specific implementation process in Section 2.C.6 of the FEIS details the evaluation procedures to select the appropriate site-specific treatment options. Section 4.B.3.b (Wildlife Resources), Section 4.B.2.b (Aquatic Resources), and Appendix J (Herbicide Characteristics) of the FEIS note that herbicides proposed for use on the S-CNF do not bioaccumulate.

9.28 See discussion of leaching provided in Section 4.B.2.b.

9.29 Adequate discussions of cumulative effects have been disclosed throughout Chapter 4 of the FEIS.

9.30 See Sections 4.C.4 and 4.D.4 and Tables 2-5, 2-6, and 4-8 for a discussion of the many sources of economic losses attributed to weed infestations. Although losses of ecosystem integrity and biodiversity are discussed, placing economic merits on intrinsic values was not attempted.

9.31 Typically, wildlife management agencies, such as the Idaho Department of Fish and Game, manage populations. Land management agencies, such as the Forest Service and Bureau of Land Management (BLM), manage habitat and monitor habitat trends. The population information that is available from the wildlife management agencies is included in Section 3.C.3 of the FEIS. Because of this difference in management responsibilities between agencies, the scope of this FEIS focuses on the foreseeable effects of weed treatments, or limited treatments, on individual species and their source habitat. Habitat-based evaluation is a reasonable method of assessing potential project effects on S-CNF wildlife resources. In addition, the analyses in Sections 4.B.1, 4.B.2, and 4.B.3 conclude that there would be minimal to no adverse impacts to Management Indicator Species (MIS) or Threatened, Endangered, and Sensitive (TES) species, thus no significant effects to populations or population viability are expected. Source habitat for these species would improve in varying degrees, depending on the alternative, which would also improve population viability of all species in the long term.

9.32 Many programs are organized by the counties through the Cooperative Weed Management Areas (CWMAs). Specific Forest activities include pamphlets, brochures, county-fair booths, and wildflower walks with elementary and middle school children to name a few. Education and learning are always effective.

9.33 The FS states that biological agents would be released on the SCNF as part of the various alternatives (DEIS Section 2). How many of these agents are native organisms? Non-native organisms? What are the reasonably foreseeable impacts of such agents, including impacts to non-target vegetation, biological communities, biological diversity, soils and other resources and values on the forest? What are the unknowns? What are the reasonably foreseeable impacts of biological control agents compared with other methods? What are the unknowns?

9.34 The DEIS states that some alternatives would result in increased sedimentation compared to others (DEIS 4-12 et seq). This is allegedly because fewer infested acres would be treated and destabilization of soil from noxious weed growth would continue. Over what time frame are the comparisons made? Long-term or short-term? And how much follow-up treatment would have to occur over the long-term under the various action alternatives to eliminate or reduce invasive species?

9.35 The FS has treated hundreds or thousands of acres of the SCNF a year since the mid-80s (DEIS 1-5). What is the effectiveness of these treatments over the long-term when combined (or not combined) with measures described in paragraphs 2 and 5 of this letter? Has any long-term research been conducted? Is there any reason to expect different results this time?

9.36 You state that areas where herbicides will be sprayed could include roadless areas, proposed wilderness, RNAs, W&S rivers and other remote and recreationally important lands (DEIS 4-64). How do you plan to keep people from being sprayed in such areas, especially where travel distances are long and installations of signs will be difficult? And what of the non-human species that may be impacted by spraying? How will important populations of these species be impacted in these areas?

9.37 Given the rugged topography of many areas of the SCNF and the potential for rapidly changing weather conditions, how can the FS predict herbicide dispersal under this project (DEIS Mitigation Measures)? What is the effectiveness of the mitigation measures at controlling drift of herbicides (whether sprayed aerially or from the ground)? The FS should disclose the potential for herbicide drift under various weather conditions and other conditions. The distance a sprayed biocide can travel is highly variable. Fog, inversions, warm temperatures, thermals, and wind affect the droplet settling time and the distance drift is carried, occasionally sweeping biocide particles 10 to 50 miles away. (Grier, Norma, 1988, J. Pest. Reform 7(4)). These factors should be considered.

9.38 What is the role of road decommissioning, road closure, and travel management restrictions in preventing the introduction and spread of invasive species? Is the implementation of these measures adequate across the SCNF? Have travel management restrictions been consistently enforced on the SCNF? Not enforced? Effects measured?

9.39 The DEIS states that trucks and ATVs are proposed to be used for chemical spraying in this project (DEIS 2-15&16). The environmental analysis should have assessed the direct, indirect, and cumulative impacts of all road construction, reconstruction, and modifications of access management whether planned or unplanned as part of this action. The FS should disclose whether the motorized use proposed here is likely to lead to further motorized use or access in illegal or environmentally sensitive areas. All road construction and access route proposals must be accompanied by a complete analysis specifying the number of miles, location, cost, and quality of road construction. The analysis must include the current and future open road density and total road density in the general project areas, including the analysis area. The analysis should also include a description (with accurate maps and tables) of all roads—temporary, system, nonsystem, other public and private, etc. and all roads and other routes to be used in this project. This should document all roads/routes in the project area. Locations of road/route closures should be revealed, the method of closure, and what if any traffic would be allowed on the "closed" roads. In addition, the FS must examine the de facto effectiveness of its road/route closures, and explain how closure effectiveness will be ensured through proper monitoring. Impacts of road use, other access route use, and off-road use in all areas should be analyzed. The FS should analyze whether any use of roads or access routes in this project by the FS could directly or indirectly lead to the risk of other parties using roads or access routes. The FS should analyze whether any use of roads or access routes in this project by the FS could directly or indirectly lead to the risk of other parties using any off-road areas.

9.40 cont. Chemical spraying via motor vehicles (trucks, ATVs and airplanes or helicopters) or even backpack sprayers could limit the ability of the operators to observe what sensitive resources they are spraying, due to rapid speeds and the

9.33 Disclosure of biological agents is contained in Appendix C and Section 2.C.1.b of the FEIS. The effects of biological control treatments are thoroughly described in Section 4.B.1. All of the insects currently used as biological control agents on the Forest, like the non-native species they combat, are non-native.

9.34 The analyses of soil resources and sedimentation are described in Sections 4.B.2, 4.C.1, and 4.C.3 of the FEIS. Long-term and short-term impacts are described. The need for follow-up treatment is dependent on the type of treatment, target species, size of infestation, extent of the seed bank, etc., and cannot be quantified.

9.35 A discussion of previous effectiveness monitoring is included in the FEIS in Sections 1.C.1 and 1.C.2.

9.36 Mitigation measures presented in the FEIS will adequately inform the public about spraying areas. Chapter 4 adequately addresses the potential effects of treatments on human and non-human populations.

9.37 Mitigation measures and treatment requirements describe a fairly narrow window of suitable aerial spraying opportunities, including prohibitions on spraying during inversions and when weather forecasts predict winds and other unsuitable conditions. Appendix E of the FEIS describes aerial spray recommendations and spray dispersion models.

9.38 Two transportation plans are in effect on the S-CNF (Salmon NF Transportation Plan and Challis NF Transportation Plan). Travel management restrictions are identified in both transportation plans, however, the travel management plans allow off-road travel. Where travel is restricted, it has been generally accepted by the public.

9.39 The two current Forest travel plans will not be modified to support any activities proposed in this FEIS, including any plans relating to the current management of roads. There are no proposals to construct, maintain, or decommission roads in this FEIS. It is recognized that there is a chance that the public may use roads that have been used by Forest personnel in their treatment activities.

9.40 There is little risk of over-application from truck, ATVs, or backpack sprayers because they do not move rapidly. In addition, truck applications include a driver and an applicator and are equipped with highly sensitive and responsive spray equipment to reduce the risk of inaccurate or over-application. Flaggers and ground observers on the aerial applications reduce the risks of over-application for that treatment method. The need for follow-up treatments cannot be quantified (see Response 9.34). However, mitigation measures and label directions limit the frequency of application.

9.40 cont. need to observe driving/flying/walking rather than watching the sprayed targets. Aerial spraying, proposed in the scoping notice, entails additional risks and environmental effects that should be fully evaluated in the environmental analysis. The DEIS also states that aerial applications of herbicides will be proposed in areas that are remote. We are concerned that, if this is the case, then heavier applications could occur in these areas with resulting impacts to non-target plants, soils, watersheds, and other non-target resources. The analysis should disclose the full impacts of spraying any areas with extensive infestations, spraying heavier volumes and/or spraying in remote habitats. Follow-up treatment is a foreseeable action for many of the weed species and is contemplated. All follow-up treatments must be analyzed in the NEPA document in terms of wildlife, watershed, economic and other impacts.

9.41 Roads and access routes should only be built in this project area if they are consistent with objectives for the protection of wildlife, aquatic species, watersheds, soils, and recreation. Road/route closure and road/route obliteration should be considered on existing, ongoing, and planned roads/routes in the project area.

9.42 Roads are the number one problem facing our public lands today. In fact, they may be greatly contributing to the problem being addressed in this project. We are strongly opposed to any and all road construction, including temporary roads, spurs, and system roads. We are opposed to activities that may lead to more off-road motorized vehicle use. The project should be modified to avoid building any roads or access routes. The obliteration of any and all non-essential system and nonsystem roads in this watershed must be included in the project. Steven Johnson, Kootenai National Forest Hydrologist pointed out in his February 1995 paper "Factors Supporting Road Removal and/or Obliteration" that "Roads have been identified as the major impact on the forest environment." He also points out that roads, even those which have become significantly overgrown, increase sedimentation, re-direct and concentrate snowmelt runoff, and increase flow production levels.

9.43 We are fully opposed to the development of any and all roadless areas and wildernesses. We are fully opposed to motorized vehicle use in any and all roadless areas and wildernesses. The analysis must disclose if this area includes roadless areas (including all inventoried roadless areas, unroaded areas, and uninventoried (de facto) roadless areas) and wildernesses. We request that the analysis disclose whether or not the project area borders any roadless, wilderness, "wilderness study" areas, or undeveloped sections of Park lands, including those managed by the State of Montana, U.S. Forest Service, U.S. Park Service, or BLM. The EIS should analyze what impacts all aspects of the project will have on roadless characteristics, eligibility for future wilderness designation and values and resources associated with these areas.

9.44 The FS should have prepared comprehensive effects analyses for each of the proposed activities on all forest management indicator species. What are the species-specific habitat losses expected to occur as a result of implementing each alternative? We request projections of effects on these species both site-specifically and in regards to habitat forest-wide as a result of the proposal. The analysis should show that the indicator species identified are in fact appropriate indicators of environmental changes in these areas for this type of project. If the biologists feel it is appropriate to document impacts using substitute species, they should accompany such a substitution with reasonable justification.

9.45 The FS should have addressed the related issues of "population viability" and "distribution throughout its geographic range" in regards to all species of concern, in order to comply with USDA Regulation 9500-4 and 36 CFR 219.19. To adequately analyze population viability, you must explicitly consider population dynamics. Population dynamics refers to persistence of a population over time—which is key to making predictions about population viability. The District should fully analyze population growth rate, population size, linkages to other populations, and the dynamics of other populations in examining population dynamics.

The analysis should have established that the species in the analysis area are still part of viable populations in the surrounding landscape following the impacts from past development actions on lands of all ownership. The analysis should be expanded to include a cumulative effects analysis area that would include truly viable populations. Identification of viable populations must be done at some geographic scale. This means if the analysis cannot identify viable populations of MIS and TES species of which the individuals in the analysis area are members, the analysis fails to assure the maintenance of viable populations and falls far short of meeting the requirements of a scientifically sound "ecosystem" analysis.

9.46 What documentation is there that demonstrates that the proposed 15, 50, 100 ft. etc. buffers proposed would be effective (DEIS 2-44&45)?

9.41 No roads will be built or closed in support of this project. See Responses 9.39 and 2.1.

9.42 See Responses 9.41 and 9.38.

9.43 The FEIS discloses areas designated for special uses (see Section 3.D.4). All criteria pertinent to these special uses were applied and analyzed as part of Section 4.C.4.

9.44 The effects analysis describes the effects on both species and their habitat through the discussion of source habitats, as noted in Wisdom et al. (2000). See Section 4.B.3 and also Response 9.31.

9.45 The cumulative effects analysis encompassed the landscape scale of the entire S-CNF, which is considered adequate for this proposal. See also Response 9.31.

9.46 See Response 2.26.

9.47 Why are there no maps of the alternatives or the specific proposed areas where spraying and treatment would take place (or schedules and quantities of materials sprayed)? How is it possible for the public to evaluate this proposal in the absence of this information?

9.48 INFISH Guidelines allows the FS to only "apply herbicides, pesticides, and other toxicants, and other chemicals in a matter that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish" (INFISH DN A-12). What are the cumulative effects of herbicide spraying combined with other past, present, reasonably foreseeable events/activities, including impacts on spawning fish and fish food sourcesd? What herbicides and other chemicals will leach into streams? What are the margins of error for herbicide spraying? How will the FS thus avoid adverse effects to inland native fish or fish habitat? What are the populations, population trends, and levels of habitat for MIS and TES fish species in the project area? How will the FS meet other requirements PACFISH, memoranda of agreement on aquatic species, conservation strategies for aquatic species, and the like? How will the FS meet the latter two for terrestrial species that might be impacted, also?

9.49 There are numerous waterways on 303(d) lists for the SCNF (DEIS 3-72&73). We are concerned that this project will impact these waterways further, despite mitigation measures. How effective will mitigation measures be?

9.50 The FS needs to conduct proper surveys for MISs, TES species and other key species and assure the public that they are protected.

9.51 Several thousand elk migrate to the SCNF (DEIS 3-65). The project could impact elk and other ungulates in grassland habitat, calving areas and other habitat. The impacts of heavy spraying in these areas are not fully evaluated.

9.52 Some of the TES birds known to the SCNF and other migratory birds may be vulnerable to proposed spraying because of locations where they nest, the susceptibility to eggs to sprayed particles, or other factors (DEIS Wildlife). The FS needs to consider impacts to other species of migratory birds as well. The FS and its agents must not take migratory birds in violation of the Migratory Bird Treaty Act.

The FS must ensure the public that this project conforms with recent Executive Orders on Migratory Birds, Environmental Justice, and Riparian Areas regarding targeted (or potential non-target sprayed) areas and targeted (or potential non-target sprayed) resources.

9.53 "Of all groups of wildlife species, amphibians are potentially the most sensitive to herbicides because of their complex life cycle; almost all species require moisture of some form of water to complete their life cycle, and most are aquatic in their egg or larval stages" (BNF DEIS 4-23; see also this DEIS 3-44). Several amphibians and aquatic species could be impacted by the project. The FS does not assure the public that mitigation measures are adequate to protect these species.

9.54 Impacts of noise, disturbance and other potential effects to bald eagles, grizzlies, wolves, wolverines, martens, fishers, lynx, goshawks and similar species requiring remoteness (or freedom from disturbance) resulting from this massive project needs to be more clearly disclosed (DEIS 3-81).

9.55 Does the FS conclusively know all the byproducts or impurities in the herbicides it proposes spraying (DEIS 2-12 to 16)? What substances do these herbicides break down into and what are their effects? Does the FS conclusively know all of the adverse effects of such byproducts, impurities, and substances? Of substances yet to be introduced and used?

What are the long-term impacts of the herbicides, byproducts and impurities proposed for use here?

9.56 What types of substances do the herbicides proposed for use degrade into? Do these substances produce any adverse effects?

9.57 What organisms can be impacted from diluted chemicals and surface run-off?

9.47 Weed infestations are displayed for the S-CNF in Map 3-1 and for the individual Ranger Districts in Maps 3-2 through 3-8. Appendix J of the FEIS has been expanded to provide additional information on the toxicology profiles of herbicides used or proposed for use on the S-CNF; typical and maximum application rates for herbicides on the S-CNF, aquatic assessment levels of concern, and risk quotients; and buffer widths and associated restrictions on herbicide application. Annual implementation and site selection are based on district priorities, previous treatment and monitoring results, recent inventory data, and site-specific implementation that best achieve weed management goals for each district and the Forest overall.

9.48 Sections 4.B.2 and 4.B.3 of the FEIS provide an in-depth analysis of project impacts, risks, and cumulative effects on aquatic and terrestrial species.

9.49 The full analysis is presented in Sections 4.C.1 and 4.C.2 regarding mitigation measures and their effectiveness on these waters.

9.50 A Biological Assessment in connection with this FEIS has been prepared for the USFWS and NMFS. The Biological Assessment fully addresses and analyzes the project effects to TES. Potential project effects on Forest Service sensitive species (which includes all MIS) are evaluated in the Biological Evaluation contained in Appendix L of the FEIS. See also Response 9.31.

9.51 Section 4.B.3 adequately discusses impacts of spraying.

9.52 See Response 2.19. The S-CNF does not anticipate any "take" of migratory birds through implementation of the proposed project. Effects on migratory bird species and rationale are addressed in Section 4.B.3 of the FEIS.

9.53 The stated mitigation measures are adequate to provide reasonable assurance that chemicals will not enter the environment at harmful concentrations. Mitigation measures described in this FEIS are in addition to herbicide label restrictions. Herbicide label restrictions are developed by the manufacturer and EPA to ensure that application of herbicides are conducted in a manner that protects human health and the environment. See Section 4.B.2 and Responses 2.52 and 7.4.

9.54 Effects of, or from, such disturbance have been analyzed and effectively mitigated. See Sections 2.D.3, 4.B.2, and 4.B.3 of the FEIS.

9.55 The FEIS acknowledges there are unknowns regarding the risk of breakdown by-products. The analysis of the long-term effects used the most current and up-to-date research available. The research shows that there are likely no or minimal effects from the application of these herbicides at the rate and method proposed. See also Responses 7.5 and 9.26.

9.56 See Response 9.55.

9.57 It is unreasonable to develop a comprehensive list of all potentially impacted organisms. A full analysis of the effects of chemical treatments on representative species is presented in Sections 4.B.2 and 4.B.3 of the FEIS.

9.58 What are the full impacts of any new herbicides that may be approved by EPA or may be used here in addition to those listed in the DEIS?

9.59 The FS states that "many people…regard pesticides as a necessary part of their business and as a relatively safe tool, if used properly" (DEIS 4-79). What about chemically sensitive individuals in the area who are not informed of herbicide use or have difficulty leaving the area (including residents, travelers, hunters, anglers and recreationists)? What about cumulative effects to them? Is chemical sensitivity increasing? Increasing among certain populations? What is the nature of the cumulative (and additive and synergistic) effects of chemical sensitivity in populations?

9.60 Did the soil testing mentioned on DEIS 4-53 test the actual groundwater to determine whether any herbicides entered the groundwater or just test the soil to a certain depth? For all chemicals to be used? How long did the soil testing last?

9.61 During what times of the seasons would herbicide spraying take place and what vulnerable plant and animal species could be impacted at various times of the year? At what volumes? What would be the effects?

9.62 What woody plant (including young trees, shrubs, etc.) mortality would occur as a result of spraying? What species? How would this affect regeneration, rare plants, biological communities, and wildlife habitat?

9.63 We note that there is a general discussion, but there is not a lot of discussion of specific impacts of noise, disturbance and human presence on wildlife resulting from the action alternatives (DEIS-Wildife/TES species/noise).

9.64 How would herbicides affect young organisms, fetuses, or eggs of wildlife at these critical times in their lives?

9.65 What are the impacts to snakes? The BNF DEIS states that herbicide spraying could increase snake mortality rates temporarily (BNF DEIS 4-28)? What about amphibians and other reptiles?

9.66 Since levels of funding "would ultimately determine the schedule for addressing and implementing treatment priorities" how would this effect what treatment priorities #1-6, the degree to which IWM is used, or the minimum tool approach to be used (DEIS ES-6)? Could funding levels override these (for example could aerial spraying be used where not appropriate, or could certain weed populations be targeted before others where not appropriate)?

9.67 How is issue #7 considered in this analysis (DEIS ES-21)?

9.68 You state that "recreational and commercial uses… have facilitated the spread of introduced species throughout the SCNF" (DEIS 1-2). What steps are you taking to reduce the spread?

9.69 In 1989, the CNF reported that "the noxious weed project acres covered within the Challis National Forest EA totaled 30,020 acres" (DEIS 1-5). Weed projects also took place on the SNF (DEIS 1-5). Herbicides were used in on virtually all acreages (DEIS 3-19). Yet there is little analysis of the success of spraying and other treatment in these very areas, the issue of whether additional treatments have been necessary, and success and cumulative effects of these methods.

9.70 What does the EIS mean when it says Congressional authority did not occur until 2000 (DEIS 1-15)?

9.71 The FS states "The SCNF Noxious Weed Management Program EIS is not a general management plan for the project area or a programmatic EA [?]. It is a linkage between the Forest Plans, weed management activities, and requirements established by NEPA" (DEIS 1-17). What kind of NEPA decision is this? What kind of activity is this? It seems the FS wants to have it both ways. The FS should have analyzed this as a programmatic amendment and conducted the appropriate analysis.

9.72 Neither IWM or IPM are defined in the glossary (DEIS I-17). The FS should have explained these, explained what it is trying to carry out, and explained what alternative treatment protocols are possible. Several of the other acronyms are not explained in the text.

9.58 New chemicals would require full EPA registration and completed risk assessments. All established buffers and mitigation measures would apply, hence the anticipated impacts of new chemicals would be minimal.

9.59 The risk to human health is fully analyzed in Section 4.D.1. Mitigation measures are designed to inform the public so avoidance measures can be taken.

9.60 Both soil and groundwater were tested for those chemicals listed. See Section 4.C.2 of the FEIS.

9.61 Chapters 2, 3, and 4 of the FEIS adequately describe herbicide application, the resources potentially impacted, and the effects of application on the environment.

9.62 It is expected that non-target woody species would not suffer significant mortality at the concentrations proposed and the applied mitigation measures. See Section 4.B.1.

9.63 The level of impact analysis is adequate; it is noted in the FEIS that any effects will be temporary.

9.64 A full analysis is presented in Section 4.B.3. See also Response 7.5.

9.65 There is a potential for minimal short-term risks to all wildlife species, as discussed in Section 4.B.3.

9.66 The priority process is clearly described in Section 2.C.2 of the FEIS. See also Response 9.47.

9.67 See Response 2.1.

9.68 The FEIS addresses prevention and treatment strategies for weed management. See Section 1.A.1.

9.69 The 30,020 acres presented in Section 1.C.1 of the FEIS are the acres within the Challis National Forest Noxious Weed and Poisonous Plant Control EA project area, not the acres of weed infestations or acres treated. Section 1.C.2 discusses the past treatment strategies. Little monitoring was performed in the early years of weed treatment. Since the late 1990s monitoring has increased in importance. Recent monitoring protocols and results are summarized in Sections 1.C.1 and 1.C.2 of the FEIS.

9.70 Formal combining of the two national forests required Congressional authority, which did not occur until 2000.

9.71 This is a Final Environmental Impact Statement on the treatment of noxious and non-native invasive weeds across the S-CNF.

9.72 IWM/IPM are thoroughly described in the FEIS in Sections 1.A.1 and 2.C, and are included in the list of acronyms and abbreviations in Chapter 7.

9.73 What is considered to be the approved management plan, the FS Strategy (DEIS 1-18)?

9.74 Grazing is proposed as a treatment (DEIS 2-11). To what degree does grazing contribute to the introduction or spread of noxious weeds itself? What are the impacts of grazing for this EIS and across the SCNF?

Regarding grazing:

9.75 [Livestock grazing already impacts the vast majority of the SCNF. Approx. 80% of the NF is allocated to grazing (DEIS 3-76). To what degree is this already-permitted grazing contributing to the spread of invasive species? How will it impact invasive species and native species? Are any of the 20% of areas unallocated to grazing proposed for grazing in this project and how will these areas be impacted?

9.76 [Livestock grazing has caused a tremendous amount of damage on public lands for the benefit of a handful of ranchers who profit off public lands at the expense of both taxpayers and biological integrity. We have specific comments regarding your analysis, and recommend steps you should be taking in considering allowing grazing to continue on these allotments.

[The vast majority of riparian areas in the West have been heavily trampled, the fisheries habitat all but ruined, and the water polluted by excessive sedimentation and livestock waste.

9.77 [Given the large-scale and undeniable damage to ecosystems that livestock have caused here in the western U.S., we are opposed to continuing this practice on public lands. The idea of somebody's domestic animals eating up the riparian areas—the most biologically diverse portion of terrestrial ecosystems—and leaving waste in the creeks and springs on our national forests is bad enough. That the public pays for these devastating activities in the form of subsidies for welfare ranchers is a symptom of government intransigence.

[We are aware of the potential for grazing impacts on the land to be severe in some sites. <u>An issue thus arises that no amount of livestock grazing can be sustained on some portions of these allotments in the near future due to the needs the area has for recovery.</u>

9.78 [What effect will the grazing have on habitat for endangered, threatened, sensitive, and management indicator species? What are the results of surveys in the areas for any of these species which may use the habitat in the allotment area?

9.79 [The EIS should analyze the significance of the impacts of past impacts on populations of these species accruing from livestock grazing, its connected actions, and other human development activities. The EIS should discuss the available data from Forest Plan implementation monitoring on how populations have responded to grazing and other management actions. If sufficient data is not available to indicate trends for these species, the EIS should say so and the analysis be expanded to acquire the information so that cumulative impacts from further grazing and other ongoing actions in the area can be adequately analyzed.

9.80 [What is the significance of the impacts from past livestock grazing and other management actions on the diversity of plant species in the analysis area?

9.81 [Livestock grazing has adversely impacted many riparian areas. Fragile riparian ecosystems tend to be heavily impacted by livestock. It is ultimately reasonable to withhold grazing from all riparian areas. We request that a grazing alternative such as this be included for full analysis and comparison with other alternatives.

9.82 [What is the condition of all watersheds and other riparian areas in the analysis area, especially in regards to past management activities including livestock grazing? <u>Please analyze the significance of the adverse impacts grazing has had upon fish and other aquatic organisms.</u> The EA should disclose the results of <u>up-to-date</u> monitoring and surveys of fish habitat and watershed conditions.

9.83 [What are the impacts on water quality, temperature, stream channel morphology alone, and cumulatively with roads, natural and prescribed fire, logging and other management projects? How have streamflow quantities changes—do you have baseline information on this?

9.73 Your comment is unclear regarding the 'approved management plan'. The Forest Service policy and strategy for weed management is called Stemming the Invasive Tide: Forest Service Strategy for Noxious and Nonnative Invasive Plant Management (1998), is described in Section 1.E.3, and is also available on the Internet.

9.74 The impacts of controlled livestock grazing as a treatment option are fully explained in Section 4.B.1. Livestock grazing is identified as one of many vectors of weed spread.

9.75 Specific criteria and requirements where controlled livestock grazing may be considered as a treatment option have been developed and described in Section 2.C.1. The required project operation plan is a specific mitigation measure.

9.76 Your opinion is noted. See Response 2.1.

9.77 Your opinion is noted. See Response 2.1.

9.78 See Response 9.75. The analysis of potential impacts from this treatment option are presented throughout Chapter 4.

9.79 Cumulative effects from past, present, and foreseeable activities on the S-CNF are discussed throughout Chapter 4. MIS and TES species are specifically discussed in Sections 4.B.2 and 4.B.3. See also Responses 9.31 and 9.50.

9.80 This FEIS is not a livestock grazing allocations environmental impact statement.

9.81 See Response 2.7.

9.82 A summary of rangeland conditions is presented in Section 3.C.1.b.4 of the FEIS. See also Response 9.80.

9.83 The question is unclear. If you are referring to how general livestock grazing has impacted these resources, see Response 2.7. If you are referring to weed treatment impacts on these resources, see Chapter 4 of the FEIS.

9.84 [The EIS should show that the proposed alternatives would comply with the Clean Water Act and all state water quality laws and regulations. This includes stating the beneficial uses of the streams and how these beneficial uses have been impacted or degraded by past management actions, and how these beneficial uses would be impacted by the various alternatives.

9.85 [Please disclose how much money the Forest Service has received annually for each allotment since the present AMPs were written. Please disclose how much has been spent by the Forest Service each year in administering each allotment (please itemize these costs).

9.86 [The analysis should contain all costs and adequately discuss all current, in place benefits—the costs of past and proposed specific improvements should be fully disclosed. The analysis should include ongoing and future impacts to recreation, and all costs related to the project including costs of preparing the analysis, all specialist support and consultation, costs associated with travel management and administration, road maintenance, weed control, costs of doing fencing, water, and other related improvements.

9.87 [We request an economic analysis that compares the expense of restoring these damaged areas, on a continuing basis, with a no-grazing scenario.

9.88 [Plants that cattle don't eat are more likely to survive, shifting the natural balance of grass, forbs and shrubs. This creates perfect conditions for many noxious weeds. The invasion and spread of noxious weeds by cattle is widely known and accepted. Many roads are open so that permittees can move cattle around, therefore the impacts of open roads on noxious weeds is a grazing problem as well. Please analyze the site-specific and cumulative impacts in the allotment.

9.89 [What new invaders are present and how will these be controlled when wandering livestock eat seed or carry it to new sites? For existing weed sites, effective management would involve yearly follow-up and monitoring of each noxious weed site and closure of affected main roads to prevent vehicular spreading to even more areas.

9.90 [Cows trample and eat young trees— examining new plantations in national forests provide graphic examples. What is the impact of grazing on the trees and plants of these allotment areas?

9.91 [Compaction by cattle likely slows seedling growth rates, creates stress for any plant that is stepped on, and may impact roots of larger trees as well. Compacted soils on slopes don't retain moisture as well, and this can cause more runoff than uncompacted slopes, and impact riparian areas that typically absorb the water. Please analyze the effects of cattle on native plant diversity and soils.

9.92 [We are concerned that detrimental soil thresholds may already have been exceeded in grazed areas. The EIS should include disclosures of the amount of detrimental soil conditions due to past activities.

9.93 [The EIS should analyze the degree to which livestock grazing has affected the succession of forested stands in the area, and thus will continue to cumulatively impact the vegetation and wildlife species. From the abstract of Belsky and Blumental (1995):

> Ponderosa pine and mixed-conifer forests of the western interior United States have changed structurally and compositionally since settlement of the West by EuroAmericans. Many of these forests historically consisted of widely spaced trees underlain by dense grass swards; however, over the last 100 years they have developed into dense, often diseased, flammable thickets. These changes, sometimes referred to as a decline in "forest health", have been attributed primarily to two factors: active suppression of low-intensity fires that formerly reduced tree recruitment, and selective logging of fire-tolerant and disease-resistant trees. A third factor, livestock grazing, is seldom discussed, although it may be more important than the other factors. Livestock alter forest dynamics (1) by reducing the biomass and density of understory grasses and herbs, which otherwise outcompete conifer seedlings and prevent dense tree recruitment, and (2) by reducing the abundance of fine fuels, which formerly carried low-intensity fires through forests. Grazing by livestock have thereby contributed to increasingly dense forest thickets. Exclosure studies have shown, in addition, that

9.84 The impacts of each alternative are fully discussed in Section 4.C.1 of the FEIS, and the current and past conditions are described in Section 3.D.1.

9.85 This information goes beyond the scope of the FEIS.

9.86 An in-depth cost analysis of the alternatives is disclosed in Section 4.D.4 of the FEIS.

9.87 An economic analysis of restoration of areas damaged by livestock grazing is beyond the scope of this FEIS.

9.88 See Response 9.80.

9.89 Table 3-3 categorizes and describes established, new, and potential invaders of weed species on the S-CNF. Section 2.C.6 of the FEIS describes the site-specific implementation process for prioritizing and treating new invaders.

9.90 See Response 9.80.

9.91 See Response 9.80.

9.92 See Response 9.80.

9.93 See Response 9.80.

cattle and sheep alter ecosystem processes by reducing the cover of herbaceous plants and litter, disturbing and compacting soils, reducing water infiltration rates, and increasing soil erosion.

9.94 [Have there been any permittee violations of the grazing permits? We would like to see a complete documentation of these violations and discussion of the action taken by the Forest Service, in the EIS. Such a discussion is fully <u>within</u> the scope of the analysis, since compliance with permit conditions is assumed in EA impacts analyses.]

9.95 We have a concern that most herbicides "are not truly selective at the species level" (DEIS 2-12). Non-target species and non-target biological communities will be impacted. How will you mitigate these impacts?

9.96 New herbicides should not be added until the FS has conducted a NEPA analysis of the effects on the kinds of resources examined in this EIS (DEIS 2-12).

9.97 Since aerial spraying is proposed on very large infestations of weeds and remote areas (DEIS 2-16), it entails added risks from heavy spraying and added risk to sensitive resources that may not be adequately identified on a reasonable scale. What specific resources will be impacted and how will they be impacted? How will these risks be reduced in the mitigation measure process?

9.98 The EIS mentions OHVs as vectors of weed spread, but not mention what other vectors of weed spread exist (DEIS 2-28).

9.99 How much of which treatment option would be or could be used when two are listed ("mechanical and chemical" etc.) The FS states that "a combination" or "one or the other" could be used (DEIS 4-7&16 etc.), but how much of each? Which? Under the worst case scenario? And what would be the impacts?

9.100 Up to 2000 acres of grazing could take place under alternative 2 (DEIS 2-43). Where? How much? Under what conditions? What resources could be impacted? What impacts would occur? What mitigation measures are provided?

9.101 Widespread spraying could occur and you will only be protecting "known" populations of sensitive plants (DEIS 2-45)? What about unknown populations that you have not looked for or found? How will you protect them?

9.102 The Proactive Prevention Alternative and Alternative E should have been analyzed in detail in this analysis (DEIS 2-49&50). If a minimum tool emphasis is part of this EIS, then you should have provided alternatives that truly emphasize a framework for a minimum tool approach. The proposed action and alternative 1 are only window dressing.

9.103 Is the extensive presence of invasive species in a minority of ranger districts realistic or simply the result of adequate data collecting (DEIS 3-2)? The EIS emphasizes potential impacts to these few ranger districts to a greater degree than impacts to other ranger districts. The FS states "as more inventories are completed, weed acres and distribution will surely increase" (DEIS 3-5). Given the open-ended nature of this project and the potential for heavy treatment in the other ranger districts, the FS has not adequately analyzed the full impacts of this project on potential treatment areas across the entire SCNF (DEIS - Sections 3 and 4).

9.104 Were all TES included in the analysis? How did the FS determine known occurrences and known suitable habitat (DEIS 3-27)?

9.105 Thorough plant and animal surveys, over an appropriate period of time, should take place. These surveys should be conducted by appropriately trained personnel and should take place at times of the year when applicable plant and animal species are likely to be detectable and identifiable. The analysis should disclose whether any factors could have affected the ability of surveyors to detect applicable species and should disclose whether any species could have been present, but may have been undetected.

9.94 See Response 9.80.

9.95 The FEIS recognizes and discloses the potential risks to non-target plants in Section 4.B.1. The mitigation measures, included in Section 2.D.3, are designed to reduce these risks.

9.96 The consideration of using new chemicals must satisfy the requirements stated in Section 2.C.1.d and be approved through an Administrative Decision from the Forest Supervisor.

9.97 A full analysis on the use of aerial herbicide application on all resources is presented throughout Chapter 4 of the FEIS. Mitigation measures are designed to reduce the risks of aerial applications to all environmental and human resources. See also Response 9.37.

9.98 The vectors are adequately described in Chapter 2 and Section 3.C.1 of the FEIS.

9.99 The combination of treatments is described in Section 2.C. The distribution of the specific treatment is site-specific and varies by weed species, the physical site characteristics, the size of infestation, and the weed management goal for the site. The treatment methods are described thoroughly in Chapter 2; potential impacts from the combined treatments are fully described throughout Chapter 4.

9.100 The controlled grazing treatment option is described in Section 2.C.1.c of the FEIS. The impacts of this option when used in combination with other treatments are described throughout Chapter 4.

9.101 Mitigation measures have been revised in the FEIS requiring a field survey to determine if species are present. If species are present, the appropriate buffer zone mitigation would apply.

9.102 The rationale for dismissing these alternatives for detailed analysis is discussed in Section 2.E.

9.103 Map 3-1, Table 3-3, and Appendix B reflect the inventoried extent of weed infestations up to 2001. The FEIS analysis fully describes the impacts of weed treatment activities as defined in the four alternatives. See also Response 9.47.

9.104 See Response 9.50.

9.105 Your opinion is noted. See also Response 9.31.

9.106 There are several aquatic species that are declining or at risk due to several factors (DEIS 3-40 to 3-44). These species have "relatively narrow habitat requirements" (DEIS 4-13). How would a potential addition of herbicides to waterways add new stresses to these rare aquatic populations?

9.107 How would the food sources of these aquatic species be impacted, and ultimately, these species?

9.108 The yellow billed cuckoo may be found in the SCNF and prefers dense vegetation (DEIS 3-48). Bald eagles and lynx are known to nest or occur in forested areas. What particular areas of habitat or populations may be treated? What is potential for impacting these listed species?

9.109 Spotted bats, big-eared bats, fishers, wolverines, boreal owls, flammulated owls, great gray owls, goshawks, three-toed woodpeckers, sage grouse and other species are known to depend on trees, grass, and other non-target vegetation that may be sprayed or treated as part of this project (DEIS 3-50 to 52). The same applies to many of the MIS species listed on 3-52. What particular areas of habitat, populations, forage habitat, and other areas may be treated? How would the noise and disturbance associated with activities contemplated or planned in this EIS effect habitat or populations of these species? What is the potential for impacting these species?

9.110 Are minimum viable populations of all species, including those listed barely at minimum viable levels or below minimum viable levels now or at the time of the Forest Service (1987a) ensured? How is local persistence of species ensured?

9.111 Of the 21 bird species on DEIS 3-61&62, the trend interpretation of approximately 15 included declines, "no data," or "uncertain." How would the SCNF ensure the viability and conservation of these species across the SCNF? If the project were implemented?

9.112 Elk migration and elk winter range is important since "several thousand animals" migrate into the SCNF every winter (DEIS 3-65). How would non-target vegetation that is important forage for elk populations be affected? Where are important summer, fall, winter and spring elk habitat areas located? When would the activities take place and how would the noise and disturbance of activities affect elk? How would vegetation be affected during "sever winters" (DEIS 3-65)?

9.113 We are concerned that several 303(d) stream segments in the project area have already impacted by chemical contaminants, degradation of habitat, sedimentation, changes in pH level, and other factors (DEIS 3-72&73). The potential addition of chemicals into these streams as a result of this project should be carefully considered. The FS should consider the degree to which this project would add new pollutants of the same type as listed pollutants or would add new pollutants of a new type from listed pollutants, and may degrade the streams further. How will this be strictly avoided?

9.114 There are serious unknowns here not fully addressed in the DEIS. The FS admits that "little is understood about the relationship between groundwater and surface water" (DEIS 3-74), but the FS assumes that these resources can be protected. The serious unknown factors of this project should be addressed.

9.115 Are only quartzites, granitic rocks, volcanic rocks, and sedimentary rocks found in the SCNF (DEIS 3-74)? It appears that there may be some soil types with fairly high infiltration risks and some with fairly high run-off risks (DEIS 3-74&75; also DEIS 4-56 et seq). Has the FS analyzed all soil types in the SCNF likely to be impacted by the project, the properties of each, and the potential effects of all activities and substances on them? What is the proximity of particular areas of soil to resources of concern and how will these resources be affected?

9.116 The FS admits that "large and small-scale timber removal activities have occurred throughout the SCNF" (DEIS 3-77). How much? Where? How has logging and associated activities affected the introduction and spread of invasive species?

9.117 cont. We are concerned about the impacts of the project on the 11 RNAs (DEIS 3-78). Specifically, what resources and biological communities were the RNAs established to protect? Other special interest areas and areas of natural heritage concern? Where are these located with respect to proposed activities? What activities are permitted and not

9.106 A thorough analysis is presented in Section 4.B.2. Mitigation measures are designed to minimize risks to all species.

9.107 See Response 9.106.

9.108 A full analysis for these species and their source habitat is presented in Section 4.B.3. See also Response 7.9.

9.109 See Response 9.108.

9.110 See Response 9.31.

9.111 See Response 9.31. Several mitigation measures are presented in Section 2.D.3 that are designed to minimize the potential for adverse effects to all species.

9.112 See Responses 2.39 and 9.62.

9.113 A full analysis can be found in Sections 4.B.2 and 4.C.1 of the FEIS. The mitigation measures described in Section 2.D.3 are designed to minimize the potential adverse impacts from chemicals accessing waterways.

9.114 See Section 4.C.1. The site-specific implementation process, strict mitigation, and buffer zones provide reasonable protection of applications in surface water and shallow water tables.

9.115 There are more than 500 soil map units identified on the S-CNF that describe soil types, soil properties, and soil characteristics. Due to the complexity of soils across the Forest, the analysis focused on the soil characteristics expected from their geologic sources. Guidelines were developed (see Appendix F, Leaching Sensitivity and the decision tree [Figure 2-1] in Chapter 2) to determine which treatment options are appropriate on a particular site.

9.116 Past, present, and future human uses including logging have been addressed in Chapters 3 and 4 of the FEIS.

9.117 There are 20 Research Natural Areas (RNAs) – 11 in the original Challis NF and 9 in the original Salmon NF. RNA designation was directed toward maintaining ecosystem processes and focusing on unique or rare vegetation characteristics. A full analysis is presented in Section 4.C.4.b of the FEIS, and mitigation measures designed to minimize impacts to special designated areas are presented in Section 2.D.3. Weed treatment activities are allowed in RNAs. Map 3-11 is provided in the FEIS showing the RNAs, inventoried roadless areas, and other special designation areas.

9.117 cont. permitted in these areas? What impacts to these areas, communities, and resources will occur? How will you protect them from adverse impacts?

9.118 The FS's discussion of roadless areas only considers impacts to the 329,000 acres where roadwork is not allowed (DEIS 3-79). Are there any roadless areas where roadwork, or timber development could be allowed? What risk do these activities pose to the introduction and spread of invasive species? What preventative or other steps will you take to stop the introduction and spread of invasive species in roadless areas where roadwork, logging, or other development activities could potentially occur?

9.119 What data has been collected to determine whether invasive species or treatment have not affected existing and eligible W&S rivers in the SCNF (DEIS3-79 to 81)? What data and research exists? Did the data collected analyze the potential impacts of higher levels of treatment proposed or higher levels of infestation possible in coming years? For what reasons were the W&S rivers established or found eligible for listing (including the presence of any sensitive plants or other organisms likely to be affected)? How would the project affect them? The DEIS admits that invasive species can impact these areas (DEIS 4-66)

9.120 The FS says there have been "no reported instances" that worker health or safety have been affected (DEIS 3-82). What studies have been conducted? What medical tests were conducted? For how long? Were workers and other people in the areas considered? Were the reporting mechanisms likely to detect all human safety and health concerns that might emerge? Over a sufficiently long period of time?

9.121 The human health and safety sections of the DEIS do not address the fact that (1.) there are serious known human health effects from the substances to be allowed for use, (2.) there are serious unknown health effects from the substances to be allowed for use, (3.) the DEIS discounts the very real health effects of these substances and essentially makes claims as to the safety of these substances which cannot be demonstrated (such as those on Appx. J, DEIS 4-79, and DEIS 4-87, for example), and (4.) the DEIS relies on arbitrary impact thresholds (for example the LD50 divided by 10 for aquatic organisms (DEIS 4-18). See DEIS 3-82 to 85 and DEIS 4-76 to 89. There is ample evidence that the FS has not adequately addressed concerns such as those in items (1)-(4.) above regarding herbicides; for example, see the extensive reference list of research, articles, and other literature and website information following Belsky et. al. in the literature cited section of this letter. Impacts to wildlife and native plants (especially MIS and TES listed species and other important species) may also be serious; however, the impacts on these types of species are even more of an unknown because of the inherent difficulty (and legal and moral questionability) of testing and assessing impacts of chemicals on wild animals and other dispersed species. The FS considers intensive release of these substances into the human and natural environment without adequate analysis or safety procedures. This DEIS is inadequate.

9.122 The environmental consequences section assumes full funding and implementation every year (DEIS 4-2). What if this assumption proves to be invalid - can any of the analysis in the DEIS Section 4 be relied upon?

9.123 How were rates of weed spread determined (DEIS 4-4)? Has weed spread been occurring at the rates used? In all areas? In other areas? Is this portion of the analysis accurate?

9.124 What does the FS mean by "desertification" (DEIS 4-5). Actual desertification or conditions similar to desertification? How do global and regional climate changes and weather variations affect the spread and introduction of invasive species? Have these factors been considered? Is global warming a concern regarding invasive species? How does the agency and federal government propose addressing global warming, and invasive species impacts induced by global warming?

9.125 The FS should analyze the impacts of the heavy recreational use, motorized use, extractive development and other activities listed on DEIS 4-6.

9.126 We note that aerial spraying has the highest potential to harm native vegetation and sensitive plant species of all activities (DEIS 4-8). Is use of this technique prudent?

9.118 Treatment activities will follow the interim and final direction in the Roadless Area Conservation Rule. The appropriate mitigation measures will apply for whatever treatment activities occur in roadless areas.

9.119 Section 3.D.4.c and Table 3-16 in the FEIS have been revised to show the eligibility criteria for the Wild and Scenic river segments. Section 4.C.4.c analyzes how the specific eligibility criteria may be affected by treatment activities.

9.120 The FEIS notes that there were no reported instances of herbicide impacts to workers on the S-CNF. Since there were no reports of worker health problems, the S-CNF has not conducted tests or studies of impacts on worker health.

9.121 See Response 7.4. The analysis in Chapter 4 of the FEIS is accurate in addressing risks to the natural and human environment. References cited in Chapter 9 support this analysis.

9.122 The analysis is based on full funding and implementation of treatments up to 18,000 acres a year. Under reduced funding, it is likely that reduced implementation would occur. However, the analysis and prioritization remains the same. See also Response 9.47.

9.123 The rate of spread calculations are based on climate and plant characteristics such as a species capability to reproduce, physiology, and seed viability. The calculations were used to show how potentially prolific noxious weeds can be.

9.124 Desertification is explained in the text of the FEIS. Global warming is beyond the scope of this FEIS. Weeds are opportunistic and have characteristics that take advantage of several environmental conditions. See Section 3.C.1.a.2.

9.125 These activities are discussed in the cumulative impacts analysis throughout Chapter 4 of the FEIS.

9.126 As indicated in the FEIS, the aerial application of herbicides, along with the appropriate mitigation measures, is the most effective, efficient, and safest method to meet the stated weed treatment goals.

9.127 The DEIS only analyzes "several"supposed worst case scenarios for a number of resources (DEIS 4-14 et seq). Are these scenarios realistic worst case scenarios? Is there a possibility of worse events occurring? Have any of the scenarios actually occurred or are you hypothesizing about the results? What are the long-term results? The FS only considers "several" scenarios - could any other worst scenario events occur and what are their impacts.

9.128 How was the LC50 divided by 10 standard developed (DEIS 4-18)? Was this standard determined to be safe (or to have no impacts) for every substance considered here? For new substances that could be used when approved? How is this not an arbitrary standard?

9.129 The FS only describes what would happen within 4 miles of a release and assumes that this is a short distance (DEIS 4-27). We do not assume this is a short distance. How would resources and organisms closer to the site of the actual spill be affected?

9.130 What is the risk of wind drift (DEIS 4-27). How do local weather conditions and local weather anomalies affect wind drift? Have there been any occurrences where wind drift distributed large quantities of chemicals in areas outside of the target zone or any occurrences where wind drift distributed chemical over much larger areas than the target zone?

9.131 It appears that several of the action alternatives have moderate to high long-term habitat threats or moderate to high short-term disturbance threats, but the DEIS never quite explains these (DEIS 4-36&37). We are especially concerned about the large number of these for the proposed action and alternative 1. Why are these considered, given the threats they propose?

9.132 The FS claims there are not likely to be direct impacts on wildlife. What data and research was collected to document this claim (DEIS 4-39)?

9.133 Herbicide impacts can vary widely among species. Is there data on the impacts to all types of species here, especially MIS and TES species that could be impacted?

Thank you for allowing us to comment.

Sincerely,

Sherman Bamford
The Ecology Center

References:

Belsky, A.J. and D.M. Blumental. Effects of Livestock Grazing on Upland Forests, Stand Dynamics, and Soils of the Interior West. Oregon Natural Resources Council, 522 S.W. Fifth Avenue, Suite 1050, Portland, OR 97204, U.S.A.

C. Klaasen (ed.) 2001 'Casarett & Doul's Toxicology: the basic science of poisons' 6th. ed. New York City: McGraw Hill; and: 'Sax's Dangerous Properties of Industrial Materials' (3 vol.'s); are classic texts of traditional toxicology, that verify the facts presented in this section, a Q-RA primer.

C. Klaasen (ed.) 2000; and: EPA/Office Prevention, Pesticides & Toxic Substances (OPPTS) Aug.1998 'Health Effects Test Guidelines: OPPTS 870.4100 Chronic Toxicity', EPA-712-C-98-210. This and similar EPA guidance (cancer & developmental (in utero) tests) for the chronic effect tests are used by U.S. and OECD (Organization for Economic & Cooperative Development) governments for regulatory tests of pesticides and other chemicals.

EPA/OPPTS 1998.

See papers of Bruce Ames, a cancer mutagenicity expert on environmental causes of cancer--e.g.: Ames et al. 1987 'Ranking Possible Carcinogenic Hazards' Science 236:271-278 (17 April).

9.127 Assumptions associated with the worst-case scenarios are discussed. A number of scenarios were presented to represent a reasonable range of possibilities, across a variety of physical settings, for analysis and comparison purposes.

9.128 The LC50 divided by 10 value was developed and approved by the EPA as being a conservative standard of safety. This and other recognized safety standards are discussed in Chapter 4, Section 4.B.2 and Appendix J.

9.129 The referenced FEIS section analyzes the concentrations and effects along points closer than the 4-mile distance.

9.130 A full discussion of wind drift is presented in Section 4.B.2.b of the FEIS. Several mitigation measures address wind drift and appropriate buffers in Section 2.D.3. See also Responses 9.37 and 2.26.

9.131 Table 4-2 has been revised to provide clarity between the text and the table.

9.132 The text in Section 4.B.3.b has been revised with supporting references to clarify impacts to wildlife.

9.133 The effects analysis included a wide range of representative species and their source habitat, including MIS and TES species. See Sections 4.B.1, 4.B.2, and 4.B.3 of the FEIS.

D. Koshland 8 May1998 'The Era of Pathway Quantification' Science 280:852-853.

U. S. Bhalia and E. M. Machleder 2002 Science:297:1018. See also the news story about this paper in the same issue, pp. 948-9 (N. Ingolia and A. Murray, History Matters').

Ntl. Toxicology Program (NTP) 2001 'Report of the Endocrine Disruptors Low-Dose Peer Review' Wash. DC.

Koshland 1998.

Environmental Health Perspectives Oct. 2001, 109:10:1063-1070. (EHP is the peer reviewed journal of the National Institute of Env. Health Sciences (NIEHS), part of the Ntl. Institutes of Health).

F. Vom Saal 2000 at the Ntl. Coalition Against Misuse of Pesticides (NCAMP, now Beyond Pesticides) annual conference (videotaped presentation). Also: F. Vom Saal et al. 1995 Toxicol. Ltrs. 77:343-350; and F. Vom Saal et al. 1997 Proceedings Nat. Acad. Sciences 94:2056-2061.

Louis Gillette Jr. 2000 at NCAMP annual Conference (videotaped presentation).

Ntl. Cancer Institute 1994 'SEER Cancer Statistics Review, 1971-1991' NIH Pub. No. 94-2789, Bethesda MD.

M. Cavieres et al. 2002 'Developmental Toxicity of a Commercial Herbicide Mixture in Mice: I. effects on embryo implantation and litter size' Env. Health Perspectives 110:11:1081-1085.

Environmental Health Perspectives, July 2001, 109:7:675-680.

T. Hayes 2002 in Proceedings of the Ntl. Academy of Sciences, as reported in Science p. 447 (17 APril 2002)

R. Renner 2002 'Conflict Brewing over Herbicide's Link to Frog Deformities' Science 1 Nov. '02, p. 941-2.

EPA/OPPTS 1998, p.10-11.

Dr. John Yargo, Yale U., videotaped presentation at 1997-1998 NCAMP conference; and EPA/OPPTS 1998.

Sandra Steingraber 'Having Faith' (book--publisher and date unknown) contains many examples of developmental vulnerablity.

Arbuckle et al. 2001 Env. Health Perspectives:109:851-7

Howe et al. 1998 'Effect of Chem. Synnergy...' Env Toxicol Chem:17:519-525

Abdelghani et al. 1997 'Tocicol. Evaluation of Single and Chem. Mixtures...' Env. Toxicol. & Water Quality:12:237-243).

Information Ventures Inc. 1999 Review of the Literature in Herbicides...IV. Health Effects of Other Herbicides, avail. at http://infoventures.com/e-hlth/

W. Porter et al. 1999 'Endocrine, Immune and Behavioral Effects of...' Toxicol. & Industrial Health:15:133-150

Chapters 13-15 of Rachel Carson's 'Silent Spring'

Peter Montague 17 Oct. 2002 Rachel's Env. & Health News #754 (available: http://www.rachel.org). .

E. Green 17 Sep. '02 'Study Links Weed-Killer to Reproductive Problems' Los Angeles Times.

E. Shogren 27 Nov. '01 'Pesticides: EPA says it will accept industry data gathered by giving paid subjects chemical doses' L.A. Times.

NCI 1994.

Larry Edmunds et al. Dec. 1990 'Temporal Trends in the Prevalence of Congenital Malformations at Birth Based on the Birth Defects Monitoring Program, U.S. 1979-1987' Morbidity & Mortality Weekly Report 39:SS-4, pg. 22, CDCR.

THIS PAGE INTENTIONALLY LEFT BLANK

Pinner et al. 1996 'Trends in Infectious Diseases Mortality in the U.S.' J. Amer. Med. Assoc. 275:3:189-193.

Johns Hopkins School Hygiene & Public Health Sep. 2000 'America's Env. Health Gap: why the country needs a nationwide health tracking network' for the Pew Env. Health Commission (Chair, former HHS Sec. Lowell Weicker Jr

P. Lichtenstein et al.13 July 2000 'Env. & Heritable Factors in the Causation of Cancer' New England J. Medicine 343:2:78-85.

NCI 1994.

Johns Hopkins Sept. 2000.

GAO May 2000 'Toxic Chemicals: long-term coordinated strategy needed to measure exposures in humans', GAO/HEHS-00-80, Wash, D.C.

E. Press & J. Washburn March 2000 'The Kept University', The Atlantic Monthly p. 39-54; and: D. Shenk 22 March 1999 'Money + Science = Ethics Problems on Campus', The Nation p. 11-18.

C. Raffensperger & J. Tickner, eds. 1998 *Protecting Public Health & the Environment: implementing the precautionary principle.* Washington DC: Island Press.

Weber 1992.

Fuerst et al. 1996 'Physiological Characterization of Picloram Resistance in Yellow Starthistle' Pest. Biochem. Physiol. 56:149-161.

I. Heap, The International Survey of Herbicide Resistant Weeds. Online. Internet. November 25, 2002. Available http://www.weedscience.com

Dr. David Pimental (Cornell U.), videotaped at Beyond Pesticides/NCAMP 2001 Conference, Boulder CO (available from BP/NCAMP).

FIFRA sec. 2(bb), codified at 7 USC 136(bb).

U.S. General Accounting Office Dec.1991 'Better Data can Improve the Assessment of EPA's Benefit Assessments' RCED-92-32, Wash. D.C.

Heinzerling & Ackerman 2002 'Pricing the Priceless: cost benefit analysis of environmental protection' Georgetown [Univ.'s] Env. Law & Policy Institute, Wash. D.C. (for example).

Caroline Cox Apr 2002 'Pesticide Registration: no guarantee of safety' (http://www.pesticide.org/factsheets.html). This is an updated version of the same paper published: below

Cox Summer 1997 J. of Pesticide Reform:17:2:2-9 (journal of Northwest Coalition for Alternatives to Pesticides (NCAP) Eugene OR

NCAP Summer 1999 'Does Government Registration Mean Pesticides are Safe?' J. Pesticide Reform 19:2:3.
NGAP Summer 1999 'Are Pesticides Hazardous to Our Health?' J. Pesticide Reform 19:2:4.

Annonymous 1983 'Fed. Court Finds IBT Officials Guilty of Fraud' Science 222:488.

K. Schneider 1983 'Faking It: the case against Industrial Bio-Test Laboratories' Amicus Journal, Spring 1983, p.14 et seq..

U.S. EPA Office of Pesticide Programs (OPP) 1983 'Summary of the IBT Review Program' Wash. DC.

U.S. EPA 1994 'Press Advisory: Craven Laboratories, owner and 14 employees sentenced for falsifying tests' Wash. DC.

Thomas Dawson 24 Feb. 1982 'Risk Consideration in Pesticide Public Policy Decisionmaking', Wisconsin Public Intervenor office, Madison WI.

THIS PAGE INTENTIONALLY LEFT BLANK

Fagin & Lavelle 1997 'Toxic Deception: how the chemical industry manipulates science, bends the law and endangers your health', Common Courage Press.

Multinational Monitor Mar. '99, interview of Dan Fagin.

EPA May 1 1995 'Press Release: EPA Fines Dow-Elanco for Failure to Report...' Wash. DC., reported in Cox 2002.

PBS TV 2001 'Trade Secrets', an investigative documentary by journalist Bill Moyers, March.

GAO 1990 'Lawn Care Pesticide Risks and Prohibitted Safety Claims' RCED-90-134 Wash. DC.

P.R. Notice #96-4 (1996), available direct from the home page URL of EPA's Office of Pesticide Programs.

MT Sup. Ct. cases # 99-185, 98-678 and 96-531

EPA Label Review Manual, abstract.

EPA 2000 'Guidance for Mandatory & Advisory Labeling Statements, Pesticide Registration Notice 2000-5.

EPA Picloram Re-registration Eligibility Document (RED)'s EPA factsheet.

Pesticide Registration Notice #98-1.

http://www.epa.gov/OPPrd001/inerts.xls re inerts

Marquardt, Cox & Knight 1998 'Toxic Secrets: 'inert' ingredients in pesticides, 1987-1997'. Northwest Coalition for Alternatives to Pesticides, Eugene Oregon (home pg., http://www.pesticide.org).

NCAP Jan. '98 'Worst Kept secrets: toxic inert ingredients in pesticides', p. 3.

Ntl. Coalition for Alternatives to Pesticides (NCAMP) Feb. 1998 'EPA Reduces Oversight of Pesticide PRoducers...' Technical Report 13:2:3.

EPA Office Research & Development 1990 'Project Summary: Non-Occupational Pesticide Exposure Study (NOPES)' Research triangle Park, NC.

EPA OPPTS 1998 'Status of Pesticides in Re-registration and Special Review' Washington DC.

GAO 1992 'Pesticides: EPA lacks assurance that all adverse effects data have been reviewed', T-RCED-92-16.

U. Montana/Integrated Plant Management Committee 1998 'Mt. Sentinel Vegetation Management Final Plan' Sec. 4.17 (p. 17). Will Snodgrass (Chemical Injury Information Network, Missoula MT) exposed this conflict.

Cooperative Extension Services of MT, UT & WY '1999-2000 Weed Management Handbook'.

EPA/OPP 1995 'Re-Registration Eligibility Document (RED) for picloram' Wash. DC.

EPA/OPP 1996 'Picloram RED Facts', Wash. DC (the Re-registration Eligibility Document (RED) factsheet).

J Pesticide Reform, Fall 2002, p.5.

David Bezdicek, 6/04/2001 'New Herbicides Found in WSU Compost' Washigton State U Compost Facility homepage, index.htm Many other examples exist.

NCAMP/Beyond Pesticides Technical Rpt., May 2002.

Ravalli Republic, 6 June 2001, p. 1.

EPA OPP 1995 (Picloram RED).

THIS PAGE INTENTIONALLY LEFT BLANK

EPA OPP 1998 'Triclopyr RED Factsheet';.EPA 16 May 1997 'Clopyralid; Pesticide Tolerance...' Fed. Reg. 62:26,949-26,954.

EPA/OPP, Env. Fate & GroundWater Branch, undated 'Review of Picloram' (prepared for the '95 re-registration).

EPA OPP 1996 (Picloram R.E.D. Factsheet).

Watson et al. 1989 'Env. Fate of Picloram Used for Roadside Control' J. of Env. Quality 18:198-205.

Mayeux et al. study, cited in Watson et al. 1989.

D. Woodward 1976 'Toxicity of the Herbicides Dinoseb & Picloram...' J. Fish. Res. Board Can. 33:1671-16.

Judith Hoy, Hoy, Seba & Kerstetter 2002, 'Genital Abnormalities in White-Tailed Deer (Odocoileus virginianus) in West-Central Montana: pesticide exposure as a possible cause', J. of Env. Biology 23:2:189-197.

R. Sharpe 2001 'Hormones and Testis Development...' Toxicology Letters 120:221-232.

Illinois EPA's list, available at http://www.nihs.go.jp/hse/environ/illiepatable.htm

S. Roach, S. Rappapport, B. Castleman and G. Zeim, in a series of papers (together, in pairs and alone; one of the later, with references to others is: S. Rappaport 1993 'Threshold Limit Values, Permissible Exposure Limits, and Feasibility...', Amer. J. Ind. Medicine 23:4:683-694)

J. Schwartz et al. 2002 'The Concentration-Response Relation Between PM2.5 and Daily Deaths' Env. Health Perspectives:110:10:1025-29.

American Chemical Society 1990 'Informing Workers of Chemical Hazards: the OSHS hazard communication standard, Wash. DC

NTP 1997 Report TR-23, 1978; also the IARC picloram monograph.

EPA Office of Drinking Water 1988 'Picloram Health Advisory' Wash. DC.

Blakley et al., three papers in 1989 : two in Teratology v. 39 (pp. 237-241 & 547-553), the third: J. Toxicol. Environ. Health 28:309-316)

EPA 1995 (Picloram RED).

California Dpt. of Food & Agriculture Medical Toxicology Branch 1988 'Summary of Toxicological Data, Picloram' Sacramento CA.

Muhammed et al. 1993 Mutat. Res.:426:2:193-199; and Verikat et al. 1995 Environ. Mol. Mutagen.:25:1:67-76.

EPA 1996. 'Carcinogenicity Review for Triclopyr' Wash. DC.

EPA OPP 1998 'RED, Triclopyr' Wash. DC.

Hunter et al. 1999 'Gestational exposure to chlorpyrifos: Comparative distribution of trichloropyrridinol in the fetus and the dam' Toxicol. Appl. Pharmacol. 158:16-23. (TCP is the common metabolite of the insecticide chlopyrifos too).

EPA OPP1998 'List of chemicals evaluated for carcinogenic potential', a June 10 internal memo. See also personal communication to Caroline Cox (NCAP) from Rick Whitting, EPA/OPP on Nov. 19 1998, described in Cox Winter 2000 J. Pesticide Reform:20:4:12-19.

EPA OPP 1991 '..(clopyralid): Review of Rabbit Teratology Study Submitted by the Registrant', internal memo from T. McMahon, Mar. 20.

V. Iaglov & I. Ptashekas 1989 'The Reaction of Endocrine Cells of the Gastrointenstinal Tract in Response to exposure to 3,6-dichloropicolinic acid' Biull. Eksp. Biol. Med. 107:6:758-61.

THIS PAGE INTENTIONALLY LEFT BLANK

EPA OPP 1991 (clopyralid review memo).

Cox Winter1998 Editorial J. Pesticide Reform:18:4 (inside front cover).

Hoar, S.K. et al. 1986 'Agricultural herbicide use and risk of Lymphoma and soft-tissue sarcoma' J. American Medicine 256:1141-1147

Hays, H.M., et al. 1991. 'Case-Control study of canine lymphoma: positive association with dog owner's use of 2,4-D acid herbicides'. J. of the National Cancer Institute 83: 1226-1231.

Bond, G.G. et al. 1988 'Cause specific mortality among employees engaged in the manufacture, formulation, or packaging of 2.4-D acid and related salts'. J. of Independent Medicine 45: 987-1005.

Zahm, S.H. 1997. 'Mortality study of pesticide applicators and other employees of a lawn care service company'. J. of Occupational Environmental Medicine, 39:1055-1067.

Hardell & Eriksson 1999 'A Case Control Study of NHL and Exposure to Pesticides' Cancer 85:1353-1360.

Wigle et al. 1990 'Mortality Study of Canadian Male Farm Operators: NHL Mortality & Agric. Practices...' J. Ntl. Cancer Institute 82:575-582.

EPA 1998 'Inventory of Sources of Dioxins in the U.S.' Wash. DC (summarizing the multiple analytical results that prove this. 2,4-D is a natural precursor molecule to dioxin formation).

EPA Off. Research & Development Sept. 2000 'Dioxin Reassessment Part III: Integrated Summary and Risk Characterization' external review draft (summarizing many positive epidemiologic correlation studies for NHL).

Morrison et al. 1992 'Herbicides and Cancer' J. Ntl. Cancer Institute 84:1866-74.

Saracci et al. 1991 'Cancer Mortality in Workers Exposed to Chlorphenocy Herbicides and Chlorophenols' Lancet 338:1027-1032

Endocrinology 71:1-6 and 72:327-333.

J. Toxicol & Env. Health/Part A 54:21-36

Fund. Applied Toxicol. 30:102-108.

Porterfield 1994 'Vulnerability of the Developing Brain to Thyroid Abnormalities: env. insults...' Env. Health Perspectives 102(Suppl. 2):125-130.

Friedrich 2002 'Teasing Out Estrogen's Effect on the Brain' J Amer. Medical Ass. 287:1:29-30.

Env. Health Perspectives:109:8:851-857 (2001).

Garry et al. 1996 'Pesticide Appliers, Biocides and Birth Defects in Rural Minn.' Env. Health Perspectives 104:394-399.

EPA OPP 1996 '2,4-D Acid: Review of Chronic Toxicity/Carcinogenicty...' 23 May docket memo to the Special Review & Re-registration Branch. Also Chernoff et al. 1990 Teratology 42:651-658.

Lerda & Rizzi 1991, Mut. Res. 262:47-50.

S. Swan et al. 2002 'Geographic Differences in Semen Quality of Fertile US Males' Environmental Health Perspectives (in-Press).

K. Curtis et al. 1999 'The Effect of Pesticide Exposure on Time to Pregnancy' Epidemiology 10:112-117.

L. Figgs. et al. 1998 'Occupational Exposure to Herbicide 2,4-D acid is associated with increased lymphoma replicative index' American Association of Cancer Research 39:337-338.

THIS PAGE INTENTIONALLY LEFT BLANK

K. Atanassov 1992 'Effect of the herbicide Schpritshormit' (salt in 2,4-D) Animal Science 29:54-61.
M. Clausen et al. 1990 'Comparison of the cytotoxicity and DNA-damaging properties of 2,4-D' Arch. Toxicol. 64:497-501.

EPA OPP 1994 'RED Hexazinone Facts Summary'.

Weed Society of America 1994 'Herbicide Handbook' 7th Ed.

EPA OPP 1994 (Hexazinone RED Summary).

USFS & Bonneville Power Admin. 1992 'Risk Assessment for Herbicide Use...'.

EPA/OPP 1 Dec.1983 'E.I. DuPont Oust Weed Killer', internal memo of A. Arce to R. Taylor, Wash. D.C.

EPA/OPP 23 Feb. 1993 'Sulfometuron Methyl-Evaluation of two-generation,...', internal memo of R. Fricke to L. DeLuise, Wash. D.C.

EPA/OPP 23 Feb. 1993 Sulfometuron methyl memo; also EPA/OPP 26 Oct. 1981 'Registration of new pesticide: Oust Weed Killer', internal memo of W. Dykstra to R. Taylor, Wash. D.C.

Seyler et al. 1992 Reprod. Toxicol.:6:447-452.

EPA/OPP 6 Sept. 1991 'Pesticide environmental fate one-line summary: sulfometuron methyl', Wash. D.C.

IARC 1999 'N-Vinyl-2-pyrrolidone and polyvinyl pyrrolidone' IARC Monographs:71:1181.

EPA OPP1983. Memo from A. Arce to R. Taylor of E.I. DuPont, 13 Oct. (ID#353-UNR).

Dennis Kim & Steven Edelmana 22 Feb. 2001. An answer by MD's to a Q&A on Medscape's web site (http://www.medscape.com).

R. Guazelli et al. 1968 Acta Diabetol. Latina:5:614-623

J. Hershman et al. 1968 J. Clinical Endocrin.:28:1605-1610.

Short & Colburn 1999 _Toxicol. & Industrial Health_:15:240-275 (summarizing all this data).

Journal of Pesticide Reform Fall '96 16:3:10-11.

Multinational Monitor Jul/Aug. '93, p.4.

EPA ODW 1988.

Hoffman et al. 1984 Arch. Env. Contam. & Toxicol.:13:15-27.

Khera & Ruddick 1973, Adv. Chem. Ser.:120:70-84.

P. Perocco et al. 1990 Env. Mol. Mutag.15:131-135.

Plewa et al. 1984; Ma 1984; Yoder et al 1973 all in Mut. Res. (138:233-245; 138:157-167; 21:325-330); Puaztal 1986 Acta Botany Hung.:32:163-168.

EPA OPP 1991 'Second Peer Review of Glyphosate', internal Memo from W. Dykstra & G. Ghali, Oct. 30. Also 3 preceeding OPP documents on this issue, all cited in C. Cox 1998 'Glyphosate Factsheet' J. Pesticide Reform:18:3:3-16.

EPA OPP 1985 'Use of Historical Data in determining the Weight-of-the-Evidence From Kidney Tumor Incidence in the Glyphosate...and Some Remarks on False Positives', internal Memo from Herbert Lacayo 26 Feb..

Hardell & Eriksson 1999 Cancer March 15 issue.

M. Nordstrom et al. 1998 'Occupational exposures, animal exposure and smoking as risk factors for hairy cell leukemia evaluated in a case-control study'. British Journal of Cancer 77:11:2048-2052 (for both studies).

THIS PAGE INTENTIONALLY LEFT BLANK

Walsh et al 2000 Env. Health Perspectives:108:769-776.

Pesticide & Toxic Chemical News 14 Aug. '85, p.8.

D.A. Savitz, 1997. American Journal of Epidemiology:146:1025-103.

June 2002 _ Environmental Health Perspectives, Supplement:110:3:441-449.

T. Arbuckle et al. 2001 Env. Health Perspectives:109:8:851-7.

Barnard & Heauser in NCAA Sports Sciences Education Newsletter Vol. 2 Fall 1995.

J. of Pesticide Reform Fall '98, letters.

M.I.Yousef et al. 1995. 'Toxic effects of carbofuron and glyphosate on semen characteristics in rabbits' J. Env. Science Health/sec. B 30:4:513-534.

Daruich et al. 2001 'Effect of herbicide glyphosate on enzymatic activity in pregnant rats and their fetuses' Environ. Res./Sect. A 85:226-231.

EPA Office of Toxic Substances 1980 'Glyphosate submission of rat teratology, rabbit teratology' Reg. #524-308.

C. Bolognesi et al.1997 'Genotoxic activity of glyphosate and its technical formulation Roundup' J. Agricultural Food Chemicals 45:1957-1962.

P. Kale. et al. 1995. 'Mutagenicity testing of nine herbicides and pesticides currently used in agriculture' Environ. Mol. Mutagen. 25:148-153. Also Peluso et al. 1998 Environ. Mol. Mutagen. 31:55-59.

NCAMP 1997 Technical Rpt. 12:2.

C. Cox Fall 1998 'Glyphosate Factsheet' J. of Pesticide Reform18:3:3-16.

F. VomSaal 2000; or Rajapaske et al. 2002 'Combining Xenoestrogens at Levels Below Individuals No-Observable Effect Concentrations Dramatically Enhances Steroid Hormone Action' Env. Health Perspectives 110:917-921.

THIS PAGE INTENTIONALLY LEFT BLANK

BOARD OF COMMISSIONERS
CUSTER COUNTY, IDAHO
P.O. BOX 385 - CHALLIS, IDAHO 83226

(208) 879-2360

January 11, 2003

Salmon-Challis National Forest
Re: Salmon-Challis National Forest Noxious Weed Draft EIS
50 Highway 93 South
Salmon Idaho 83467

Attention: William Diage
Re: Salmon-Challis National Forest Noxious Weed Draft EIS

On behalf of the citizens of Custer County, the Custer County CWMA and our Noxious Weed Department, the Custer County Board of County Commissioners submits the following comments relative to the above listed Draft EIS. As commissioners and landowners we are very concerned about the spread of noxious weeds and have established an aggressive program to halt the spread of these invasive plants through our Department of Noxious Weeds. It is with interest then that we have read the Salmon-Challis National Forest Noxious Weed Draft EIS.

We believe the proposed action to be the correct one. A plan the keeps all the tools (aerial and ground based herbicide applications plus mechanical, biological, and controlled grazing) and combinations of those tools available in the battle against invasive weeds allows for the most flexibility and opportunity to be innovative.

10.1 That being said, we do have some concerns. The draft plan outlines some very ambitious levels of weed control. Ramping up from 3371 acres of ground sprayed in 2001 to 60,000 to 80,000 acres per year will not be easy nor will it be inexpensive. We realize that not all these acres are slated for chemical treatment, however by your own admission, weed treatments prior to 1995 were "very limited in scope" (pg ES-5) at 586 acres or less. It has taken six years to get to 3371 acres plus a large infusion of one time "black moneys" or wildfire dollars. This draft does not address funding nor, as we have been told, is that its intention. However, funding is critical if any plan is to be successful.

10.2 cont. The phrase that concerns us most is defined as a "custodial action." Custodial action is determined to be necessary (and we quote) "if funding and staffing levels are inadequate for full implementation of the IWM program, treatment at a specific weed site may be deferred." This phrase is the weasel clause! In all the glory and planning laid out in this Draft EIS, this clause takes it all away! There is no COMMITMENT to controlling noxious weeds on the Salmon-Challis National Forest! If weed control is not a high

10.1 The FEIS analyzes yearly treatments up to 18,000 acres not 80,000 acres. The FEIS recognizes the uncertainty of annual funding in regard to weed treatment. The prioritization process, District weed treatment goals, and the site-specific implementation process take into consideration and are a means of addressing the uncertainties of funding.

10.2 All programs and activities on the Forest are subject to annual funding direction and potential limitations. Noxious and invasive weed control has been and will continue to be a top priority and a commitment on the S-CNF. If funding for this program becomes limited, the prioritization process, the site-specific implementation process, along with District weed treatment goals described in this FEIS, will be used to determine which sites are treated. See Section 2.C.2 of the FEIS.

10.2 cont. priority for the personnel located at the district and/or forest level, you have created a beautiful out—just implement a custodial action and do nothing!

By law (7 USCA § 2418) federal agencies are to develop programs to eradicate undesirable plants and "establish and adequately fund an undesirable plants management program through the agency's budgetary process…." (Bottom of page 1-17-top of page 1-18) This law has been on the books since 1974. Two others, the 1998 *Forest Service Strategy for Noxious and Nonnative Invasive Plant Management* and the Presidential Executive Order #13211, further strengthens and further defines the FS role in noxious weed control.

The statement on page 1-5 was intended to draw attention to the rapid spread of noxious weeds and the need for action. We could not agree more about the need for action. And it does draw attention as well. When the acres of spotted knapweed on the North Fork District grow from approximately 1000 acres in 1987 to the 2001 level of more than 50,000 acres, how can we not question your commitment, even when you are required to do so by law?

10.3 The Summary Description (pgs 1-12 thru 1-15) of the Proposed Action lays out a sound framework for the control of noxious weeds. A time line for action under the "adaptive management" section would help. How long does it take "to determine appropriate future actions?" The process is outlined as to the hows but not the when. If the time line is so cumbersome that action cannot be taken when a new invader is found, we may have missed our best chance of stopping its further spread beyond an initial plant or two.

10.4 The chemicals listed for potential use to control weeds are rather exhaustive and lists most if not all the chemicals now commonly used in the battle against invasive species. No where can we see how new chemicals can be added to this list as they might become available. Do we have to wait for the next EIS before new chemicals can be added to this list? Biological treatments have a statement to the affect that "(n)ew, APHIS-approved biological controls may be substituted for current agents if more appropriate, or if current agents are no longer available or APHIS approved." Such a statement needs to be included for chemical control as well.

10.5 Although rather ambitious, limiting the amount of chemical treatment to 15,000 acres per year (pg 2-30) limits the ability to control invasive species. The author does state that some of the work after the initial year will be follow-up work. Most of the work being done in ensuing years could be follow-up. A better statement might be that no more than 15,000 acres of "new" ground will be treated using aerial or ground application.

10.6 cont. Management Practices and Mitigation Measures (a.) number 6 page 2-42 needs to be more specific. As it now reads, <u>all</u> equipment is to be cleaned. We are fairly sure that the author only intends that spray equipment be subject to these requirements, but that is not clear. Further clarification is in order. A requirement that might limit the introduction of new invaders would be to require all equipment, whether it be for road

10.3 See Response 10.2. As you mention, the framework to address new infestations is sound. However, a timeline to take action actually limits the treatment options. Chapter 2 of the FEIS carefully outlines the treatment objectives and the circumstances that trigger a particular response. Manpower, size, location of infestation, target species, time of year, and other factors are all variables used to establish treatment goals and priorities. This strategy allows a quick and effective response to new infestations and non-native species. See also Response 9.47.

10.4 There is flexibility in the use of new chemicals providing they meet specific criteria and are EPA-approved. See Section 2.C.1.d of the FEIS.

10.5 Your suggestion is noted.

10.6 The mitigation mentioned does indeed refer to all vehicles working within an infestation site and is taken from the Region 4 Best Management Practices for weed prevention and management. See Appendix A of the FEIS.

10.6 cont. building, fire, whatever be required to be cleaned before entering the S-CNF and/or moving within the forest.

10.7 The Management Practices and Mitigation Measures (a.) number 11 on pg 2-44 as it relates to no disturbance zones effectively eliminates any type of weed control in these areas. By not allowing entry into these areas from March through August, any opportunity to treat when most noxious weeds are vulnerable to treatment has been taken away. Most chemical treatments work best when the plants are young and actively growing. Biological agents forage during this time and are best transplanted during this time as well. Mechanical control is also limited to a timeframe when most plants have already set seed. Care should be taken to not disrupt the nesting sites, but to eliminate any opportunity for effective weed control may very well in itself be the undoing of the nesting sites through habitat degradation.

10.8 Management Practices and Mitigation Measures (b.), numbers 12 and 13 pages 2-44 and 2-45, place unrealistic restrictions on the use of chemicals. Restrictions for use next to water and in riparian areas have been researched in the development and licensing of the various chemicals. Placing further restrictions above and beyond the label is unnecessary and self-defeating.

10.9 Management Practices and Mitigation Measures (c.) numbers 18 and 19 pg 2-46 applies to all methods of treatment or to aerial application only? We would agree with the limits for aerial application but not for ground application for the reasons stated above.

10.10 Page 3-77 and elsewhere credits tourism with providing more than 600 jobs in Custer County, over 200 in Lemhi County and less than 50 in Butte County. Our studies would show something entirely different. The CLEM model in 1992 and an update for Custer County alone in 2000 has Custer County tourism employment numbers closer to 350. Although these numbers have no real bearing on this Draft EIS, it is important that you have them right. We would think the same error is true for both Butte and Lemhi counties, as well.

As an aside—the study dealing with mechanical control of spotted knapweed on pg 4-95 attained minimal or no control using either mowing or hand pulling. For anything other than a few isolated plants, this type of control is not a viable option in the war against spotted knapweed.

The inventory numbers and/or presence or absence of certain weeds does not necessarily agree with our inventories. Rather than discuss these differences here, we will work through the Custer County Coordinated Weed Management group to address these differences, as they have no bearing on the outcome of this Draft EIS.

10.11 cont. Education of the public is vital to and key to any successful weed control program. The mention of any type of educational program seems to be lacking in this Draft EIS. If the plan is to use the CWMA's associated with the S-CNF to conduct an educational program, that is great, but say so. The Draft EIS does allude to the fact that human

10.7 The existing Salmon and Challis Land and Resource Management Plans and the Bald Eagle Pacific Recovery Plan designate these buffers for the protection of these resources.

10.8 Buffer zones are applied to waterways and shallow water tables to reduce the risk of chemicals reaching water. This added safeguard beyond possible label instructions is valid and warranted for public land treatments and protection of public resources. See also Response 2.26.

10.9 Mitigation measures stated in Section 2.D.3.c apply to the Proposed Action specifically for the aerial application of chemicals. This has been clarified in the FEIS.

10.10 The figures shown are from the Idaho Department of Commerce as reported by Runyan et al. (1999). It is not surprising that figures from different sources would vary. The point being made is that tourism is an important factor in the local economy.

10.11 The roles of education, public awareness, and the cooperative association with the CWMAs are included in the IWM discussion in Section 1.A.2 of the FEIS. See also Response 9.32.

10.11 cont. activities are in part responsible for the spread of invasive species and suggests the elimination of some of those activities as a means to control or eliminate the spread of noxious weeds. A much better approach would be to enlighten the public of the threat that noxious weeds has on the environment they enjoy. You further suggest that visitors to the S-CNF tend to return year after year; their help could be invaluable. Another ally in the fight against noxious weeds is far better than a disgruntled public that has control of the purse strings.

10.12 One final concern deals with how this Draft EIS dovetails into other such management programs. Two areas, the Sawtooth National Recreational Area and the Frank Church Wilderness are not included in this plan. Both of these areas impact the S-CNF, especially Custer County. All our best efforts may go for naught if the weed problems associated with these areas are not a part of the overall grand plan. Cooperation and coordination with these two entities is crucial to this plans success. How or where do these areas fit into a true IWM program?

Thank you for the opportunity to comment. The plan lays out a very ambitious noxious weed program. We would like to see more of a commitment to the actual implementation of the program, but believe it is a step in the right direction. We reserve the right to make further comments as more information becomes available.

For the Citizens of Custer County,

Lin F. Hintze / EP

Lin Hintze, Chair
Custer County Commissioners

10.12 There is no formal direction provided in this FEIS linking other weed management programs across geographical or administrative boundaries. Continued coordination is important and best performed through cooperative efforts of the local and neighboring CWMAs and when planning and implementing specific treatment activities.

Comment Letter No. 11

****

----- Forwarded by William B Diage/R4/USDAFS on 01/16/2003 01:59 PM -----

Janna Brimmer
<Janna.Brimmer@noaa.gov>

01/15/2003 05:12 PM

To: wdiage@fs.fed.us
cc:
Subject: Weeds DIES Comments

Over all, I didn't see anything in the DEIS that sent up flags, just a few minor things that will probably be easier to address at this stage. You've probably already planned to address most of these.

1) Page 1-5. 1.C.2. Previous Weed Management Efforts. Consider adding info from 2002 season.

2) Page 1-19. 1.G. Supporting Documents and Past Analysis. Add 2002 consultation.

11.1 3) Page 2-11. Chemical Treatment. My initial reaction was that the DEIS should only suggest use of herbicides we've consulted on for the SCNF. However, after making a few calls, I learned this can be extended to
11.2 ones that the Forest Service has completed risk assessments on.

4) Page 2-42. Best Management and Mitigation Measures. Consider checking the 2002 Biological Opinion to make sure that all the Terms and Conditions and Reasonable & Prudent Measures have been captured.

Also, consider checking the Cottonwood BLM Biological Opinions to see that all the T & C's & RPM's in those for aerial spraying were captured
http://www.nwr.noaa.gov/1publcat/2002/2002_noxious_weed_200200385_07-11-2002.pdf
11.3

5) Page 2-49. Figure 2-1. (also page ES-20) Needs to consider designated critical habitat for chinook salmon, sockeye salmon, and bull trout. Also needs to consider Essential Fish Habitat for chinook salmon.

6) Page 3-42. Snake River Steelhead. Critical habitat was administratively withdrawn April 30, 2002.

7) Page 3-43. Bull Trout. Critical Habitat has been proposed- it's in the public comment phase.

11.4 8) Page 3-79. Wild and Scenic Rivers. Last sentence implies that weeds have expanded on the FCRONRW, which of course is true. Consider including a statement where the reader can find more info on the 'Church.

9) Page 4-8. First paragraph. Need to develop very specific criteria for when/where aerial application is appropriate. I don't know if it needs to be included in the final EIS, but we will need to consult on it.

Like I said, nothing earth-shattering. I would have liked to have given this a more thorough consideration, but I think this captures the high points. Please call or email if you have any questions- 756-6496. It's
11.5 been good working with you-

Cheers!

11.1 For purposes of consistency throughout the FEIS, the baseline described in Chapter 3, Affected Environment, has been established to reflect data obtained through 2001.

11.2 Your suggestion is noted. Previous Biological Assessments and consultation documentation are referenced in the Biological Assessment for the Proposed Action that was prepared for the USFWS and NMFS.

11.3 The mitigation measures in Section 2.D.3 of the FEIS are consistent with the 2002 Biological Assessment and Biological Opinion.

11.4 Chapter 3 in the FEIS has been revised to describe the occurrence and status of the referenced habitats on the S-CNF.

11.5 Section 2.D.2.b of the FEIS lists the criteria that will be used to evaluate the proposed aerial application sites. Map 2-3 has also been included in the FEIS depicting weed locations that meet the stated aerial application evaluation criteria.

Jan 21 03 02:17p p.1

To: Mr. William Diage,
Planning Team, Ecologist
Salmon-Challis National Forest
USDA Forest Service
50 Highway 93 South
Salmon, Idaho 83467

From: Friends of the Bitterroot
P.O. Box 442
Hamilton, Montana 59840

Subject: Salmon-Challis National Forest Noxious Weed Management Program DEIS

Date: January 14, 2003

Dear Mr. Diage:
We appreciate the opportunity to comment on your Salmon-Challis National Forest Noxious Weed Management Program DEIS.

The weed DEIS developed four action alternatives; No Action (continue current program), Proposed Action, Alternative 1 and Alternative 2. (DEIS at 2-29 to 2-39)
The Proposed Action Alternative includes aerial spraying and "a maximum of 15,000 treatment acres per year of herbicide application" by ground and aerial methods (DEIS at 2-30).
Alternative 1 is essentially the same as the Proposed Action Alternative but does not include the "aerial application" of herbicides (DEIS at 2-38).
Alternative 2 proposes to use mechanical, biological, controlled grazing and combinations of treatments. No herbicide application would be used in this Alternative (DEIS at 2-39).

Friends of the Bitterroot (FOB) views noxious weeds as a major ecological threat to forest and rangeland, but we are equally concerned about the fate of herbicide residues in soil and water, as well as their effects on human health, on wildlife and on plant diversity and succession.

FOB supports an integrated approach to weed management on public lands, that emphasizes preventative measures aimed at minimizing or eliminating soil-disturbing activities that are known causes of weed introduction and spread, including ORV use, logging, and commercial livestock grazing.

In response to various noxious weed proposals by the USFS, Friends of the Bitterroot has developed an organizational position on this issue:

Principals of Noxious Weed Control on Public Lands
Friends of the Bitterroot Organizational Position

12.1 cont. The stated purpose and goals of policies, plans, and programs should be to prevent further spread of invasive species, to prevent impacts from existing infestations, and to restore the land's resistance to exotic species.

12.1 The stated purpose and need of the project discussed in Sections 1.C.3 and 1.C.4 of the FEIS are consistent with this comment. The proposed noxious weed management program prepared specifically for the S-CNF and described in this FEIS has been prepared within the overarching framework and guidelines of existing U.S. Forest Service-wide policies, plans, and programs. This FEIS is not establishing National Forest policy, nor is it modifying existing Land and Resource Management Plans. Modification of existing S-CNF Land and Resource Management Plans through Forest Plan Revision is the appropriate process for addressing some of the visions and other resource management practices described in your comment and are well beyond the scope of this weed-focused FEIS. Those processes are the appropriate forum for working toward articulating things like 100-year visions, and discussing potential modifications of land use allocations that may contribute to the root causes of weed infestations on the forest such as logging, roads, ORVs, and livestock grazing.

Policies, plans and programs should articulate a 100-year vision of how the public and the Forest Service wants National Forest lands to be, in terms of ecosystem health and invasive species, at a region-wide, landscape level.

This vision should detail what steps need to be taken to get there in project-planning, and thus, should "back-cast" from the desired long-range future condition.

Policies, plans and programs should examine the nature and causes of invasive species establishment and spread. Consideration should be given to all soil disturbing activities, which would include logging, road construction and reconstruction, regular and off-road motorized vehicle use, and livestock grazing. Such "root causes" should be clearly identified in policies, plans and programs with respect to their role in invasive species' spread.

12.1 cont.

Policies, plans and programs should focus equally on prevention, treatment, and restoration.
The focus on prevention should result in a reduction in the root causes of species invasions.

Policies, plans and programs should identify damage thresholds, at the site-specific level, for restricting and prohibiting particular activities which contribute to the spread of invasive species.

Policies, plans and programs should direct National Forests to reduce their reliance on herbicides through prevention, reliance on natural processes and pre-project planning (e.g., not thinning beyond certain thresholds of canopy cover). Herbicides should be used only as a last resort and only in the context of prevention and restoration such that a treadmill of chemical treatments and re-treatments will not occur.

NEPA documents pertaining to new policies, plans and programs should have an alternative that focuses on prevention and restoration and involves restricting and prohibiting activities that are known to be causing weed invasions.

12.2 cont.

Off-road vehicle (ORV) trails should be closed unless posted open. Motorized travel should be limited to designated travel routes. Cross-country motorized travel should not be allowed. If no monitoring or insufficient monitoring of invasive species infestations is occurring on ORV travel routes, then use should be curtailed. If enforcement of ORV travel is not occurring to insure that users are remaining on designated routes, then use should be curtailed.

ORV use should not be allowed in Wilderness areas, Wilderness study areas, or roadless areas. There should be no distinction made between cars, trucks and ORVs, because there is essentially no difference in their on-the-ground impacts with respect to invasive species spread.

There should be no logging on sites with extensive invasive species' infestations.

There should be consideration of the value in retiring livestock allotments as they become vacated to prevent the spread of invasive species.

12.2 The purpose of this FEIS is not to analyze or amend the existing land use allocations on the Forest. It is not amending the National Forest travel plans nor is it amending permitted livestock grazing, timber management, or authorized recreational activities. Modifications to permitted land use allocations are appropriate during Land and Resource Management Plan revision. The effects of these Forest uses and activities are addressed in the FEIS as potential vectors of weed infestation and spread. Their potential cumulative effects on Forest resources, together with those of proposed weed treatments, are assessed in Chapter 4 of the FEIS. See also Response 12.1.

12.2 cont. Livestock grazing should be restricted in areas infested with weeds. and prohibited in areas where prevention, control and restoration efforts have occurred.

The precautionary principle says, 'When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.' Certainly, this method of protecting public interests should be incorporated into invasive species management.

The Development of the Precautionary Principle:
The risk assessment procedures that have been used by government EIS analysts are beginning to give way to precautionary principles, as described by Montague, 1999.

Science has no way to analyze the effects of multiple exposures, and almost all modern humans are routinely subjected to multiple exposures: pesticides; automobile exhaust; dioxins in meat, fish and dairy products; prescription drugs; tobacco smoke; food additives; ultraviolet sunlight passing through the earth's damaged ozone shield; and so on. Determining the cumulative effect of these insults is a scientific impossibility; so most risk assessors simply exclude these inconvenient realities. But the resulting risk assessment is bogus.

Risk assessment is inherently an undemocratic process because most people cannot understand the data, the calculations, or the basis for the risk assessor's judgment.

Now after 20 years, the public is catching on, that risk assessment has been a failure and in many cases a scam. Rather than allowing citizens to reach agreement on what's best, it has provided a patina of "scientific objectivity" that powerful corporations have used to justify continued contamination of the environment. With a few rare exceptions (sulfur dioxide emissions, for example) dangerous discharges have increased geometrically during the period when risk assessment has been the dominant mode of decision-making. It is now obvious to most people that risk assessment is a key part of the problem, not an important part of any solution.

In place of risk assessment, a new paradigm is ripening: the principle of precautionary action. The precautionary principle acknowledges that we are ignorant about many important aspects of the environment and human health. It acknowledges scientific uncertainty and guides our actions in response to it.

The DEIS discusses Integrated Weed Management (IWM) at 2-8 to 2-16, but in fact the Proposed Action Alternative and Alternative 1 both rely mainly on herbicide spraying for the vast majority of the treated acres, (approximately 15,000 acres per year; DEIS at 2-38).

THIS PAGE INTENTIONALLY LEFT BLANK

12.3 In reality, the S-CNF Weed DEIS refused to take a "hard look" at an alternative described as 'The Proactive Prevention Alternative', yet the DEIS (see ES-21), under issues #6 and #7, acknowledges they are a public concern, refers to the Proactive Prevention Alternative development, but then arbitrarily and capriciously dismisses full consideration and development of that alternative.

"The intent of the [Proactive Prevention Alternative] alternative is to address and take action on human activities that promote the spread of weeds, specifically, close roads, modify authorized livestock grazing permits, and alter existing timber, mining, and recreational OHV activities".
Instead, the DEIS claimed the 1987 S-CNF LRMP authorized those "uses", and then stated that "any modification of these authorized uses would require a forest plan amendment, necessitating additional public scoping and further NEPA analysis". (DEIS at 2-48)

12.4 We maintain the S-CNF weed plan DEIS did not consider a true "IWM" program (or alternative) because it essentially gives only lip service to controlling the human activities causes of weed spread, fails to really address the introduction and spread of noxious weeds, and then relies on herbicide ground and aerial application as the overwhelming method of control.

Some of the significant problems and dangers associated with aerial spraying of herbicides are discussed in the following by Dr. Ted Kerstetter.

12.5 Aerial Spraying - A Danger to You and to Wildlife:
Aerial spraying of herbicides cannot be justified because of the danger of prolonged exposure of wildlife and humans to the chemicals proposed for use. Mountain valleys, because of their topography, are exceptionally subject to atmospheric inversions, during which air is trapped in the valley for days or even weeks at a time. (Witness the smoke that filled the mountain valleys during the fires of 2000.) If spraying is done when inversions are occurring, spray drift will be trapped in valley air, and exposure of people and animals will be prolonged, even though the actual concentration of the chemical in the air may be small.

Since the toxic effect of a chemical is due to both time of exposure and dose, the impact can be serious and impossible to predict.

The EPA has been charged with the responsibility of developing test methods for the endocrine disrupting ability of pesticides, but the agency is no where near completing the process. A request for 20 million dollars in the FY 2002 budget to speed up the process was apparently not granted; the status of test development remains in limbo. Moreover, only a handful of pesticides have been tested, mostly by academic laboratories. Exposing the animal and human residents of the Bitterroot Valley to the suite of herbicides the BNF intends to spray, especially Tordon, is (consequently) an uncontrolled experiment, the results of which may not be known for years.

12.6 cont. The hormonal systems that moderate development of fetuses, e.g. estradiol, testosterone, thyroxine, MIH, and others, are exquisitely tuned to tiny amounts of hormone binding to the appropriate receptors.

12.3 The decision to dismiss the Proactive Prevention Alternative was neither arbitrary nor capricious. Section 2.E of the FEIS clearly states the rationale for its elimination from detailed analysis. See also Response 2.1.

12.4 Your opinion is noted. IWM principles and practices are incorporated into all alternatives.

12.5 A mitigation measure has been added to Section 2.D.3.c of the FEIS stating that aerial herbicide application will not occur during periods of inversion.

12.6 The herbicide descriptions in Chapter 2 and impact assessments in Sections 4.B.2 (Aquatic Resources), 4.B.3 (Wildlife Resources), and 4.D.1 (Human Health and Safety) in Chapter 4 of the FEIS have been revised to further reflect potential effects of herbicides. See also Responses 7.4 and 7.5.

Endocrine disrupting chemicals (EDC's), which may include some or all of the herbicides proposed for use, interfere with control of fetal development by hormones; when this happens, birth defects or impaired functioning of organ systems (including the brain) in newborn babies and wildlife can result.

Many white-tailed deer in the Bitterroot Valley are showing evidence of genital abnormalities that have been recently documented in a scientific journal.

12.6 cont. The herbicide of choice for aerial spraying, Tordon, is the organochlorine chemical picloram, combined with unknown "inert" ingredients which increase its toxicity. When picloram was considered for recertification in 1995, two branches of the EPA, Ecological Effects and Environmental Fate and Groundwater, recommended against its continued use.

The recommendations were not accepted. Consider the following (summarized in the Journal of Pesticide Reform fact-sheet on picloram):
1. Picloram is contaminated with the carcinogen hexachlorobenzene (HCB). HCB, in addition to causing a variety of cancers, also damages bones, blood in the immune system, and the endocrine system. Nursing infants and fetuses are particularly at risk.
2. Picloram is toxic to juvenile fish at concentrations less than 1 part per million. In Montana (near Sheridan), roadside spraying of Tordon killed 15,000 pounds of fish in a hatchery 1/4 mile downstream from the Tordon treatment.
3. Picloram is persistent and highly mobile in soil. It is widely found as a contaminant of groundwater and has also been found in streams and lakes. It is extremely toxic to plants, and drift and runoff from picloram treatments have caused startling damage to crops.

(Dr. Ted Kerstetter serves on the FOB steering committee and the HEAL team, and is a retired professor of physiology.)

12.7 The S-CNF Weed DEIS fails to adequately assess potential significant effects including cumulative effects from active ingredients, inert ingredients, adjuvants and breakdown compounds of the herbicide's formulation on threatened, endangered and sensitive species. It appears that the S-CNF managers do not actually know (or fail to disclose) what potentially adverse impacts could result from the selected action.

12.8 Active and inert ingredients of herbicides have the potential to cause significant harm to various wildlife rare species, especially amphibian species. Although a number of sensitive species have potential habitat in the S-CNF's DEIS project area, there has not been an adequate disclosure of the direct, indirect and cumulative impacts to these species from exposure to sub-lethal, chronic, sub-chronic or non-threshold doses of the full formulation herbicide mixture.

One of NEPA's primary requirements is to inform the public about the likely environmental effects of proposed agency actions, and alternatives to those actions.

12.7 A full analysis is provided in Sections 4.B.1 (Vegetation Resources and Noxious Weeds), 4.B.2 (Aquatic Resources), 4.B.3 (Wildlife Resources), and 4.D.1 (Human Health and Safety). See also Responses 7.4, 7.5, and 9.50.

12.8 See Responses 12.7 and 2.52.

As the CEQ's NEPA regulations state: "NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before action is taken . . . Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." 40 C.F.R. 1500.1(b) (emphasis added).

NEPA and applicable regulations require that agencies disclose in EIS's the basic information necessary for informed decision making and public participation. Save our Ecosystems v. Clark, 747 F.2d 1240, 1248-49 (9th Circuit 1984). Failure to include in an EIS information that is "important, significant, or essential" to decision making renders and EIS inadequate. Save our Ecosystems v. Clark, 747 F.2d at 1244, n.5.

40 C.F.R. 1502.22 imposes three mandatory obligations on the agencies in the face of scientific uncertainty: (1) a duty to disclose the scientific uncertainty; (2) a duty to complete independent research and gather information if no adequate information exists (unless the costs are exorbitant or the means of obtaining the information are not known); and (3) a duty to evaluate the potential, reasonably foreseeable impacts in the absence of relevant information, using a four-step process.

NEPA requires specific steps in the face of uncertainty. The agency "cannot avoid NEPA responsibilities by cloaking itself in ignorance." Fritiofson v. Alexander, 772 F.2d 1225, 1244 (5th Cir. 1985). The existence of incomplete or unavailable scientific information concerning significant adverse environmental impacts triggers the requirements of 40 C.F.R. 1502.22. This provision requires the "disclosure and analysis of the costs of uncertainty [and] the costs of proceeding without more and better information." Southern Oregon Citizens Against Toxic Sprays, Inc. v. Clark, 720 F.2d 1475, 1478 (9th Cir. 1983). "On their face these regulations require an ordered process by an agency when it is proceeding in the face of uncertainty." Save Our Ecosystems v. Clark, 747 F.2d 1240, 1244 (9th Cir. 1984).

Section 2(c), U.S.C. 1531(1) of the ESA requires that the Forest Service "shall seek to conserve endangered and threatened species and shall utilize their authority in furtherance of the purposes of this chapter." Similarly, section 7(a)(1), 16 U.S.C. 1536 (3) requires that federal agencies shall further the purposes of the ESA by "carrying out programs for the conservation of endangered and threatened species."

12.9 The DEIS fails to provide enough information regarding the ecological impacts of herbicides to allow the decision-maker to make an informed decision. In addition, it fails to adequately define the impacts that will result from the Noxious Weed Management Program. The information presented in the DEIS leads to more questions than answers and certainly fails to guarantee that the Noxious Weed Management Program will protect the listed fish species.

EPA fact sheets disclose that seven of the 12 listed herbicides were at least moderately toxic to fish while tests on amphibians had not been completed for most of the chemicals.

12.9 See Responses 12.7, 9.26, and 9.50.

Nearly all of the herbicides being considered for use have not been tested for chronic effects to terrestrial species while others were deemed to be toxic to birds, insects, and humans. 2,4-D, Dicamba, Glyphosate, Imazapyr, Picloram, Sulfometron, and Pyridnecarb are all moderately to highly toxic to aquatic species. However in the S-CNF's DEIS discussion of direct impacts to fisheries, the Forest Service never actually discloses what the expected impacts on native fish and amphibian populations will be.

12.10

12.11 Failing to discuss this important information fails to guarantee consistency with the NFMA's viability provisions and fails to uphold the Forest Service's responsibility under the ESA.

12.12 With so much information missing regarding the impacts of herbicides on fish and amphibians the Forest Service has an obligation to either collect such information or delay the program until many of the important questions can be answered.

The full formulation of herbicides include both active ingredients, inert ingredients, and adjuvants, each of which may have significant effects on sensitive wildlife species within the proposed project area. Potential impacts to resident wildlife populations include not only death, but a variety of non-lethal effects that might hamper reproduction, migration, and other elements of affected species' life cycles.

12.13 cont.

The discussions provided in the S-CNF's Noxious Weed DEIS mainly focused on exposure to a lethal dose of the active ingredients, and basically ignores potentially significant impacts of inert ingredients. This failure to fully disclose and assess impacts of the proposed application of herbicides is not in compliance with the NEPA and the NFMA.

There is essentially no meaningful mention of the potential for inert ingredients, additives and environmental factors to influence toxicity of the proposed herbicides. There was no discussion of the toxicity of individual inert ingredients, adjuvants or additives in the full formulation to fish and wildlife, nor was there an analysis of cumulative or synergistic effects from these substances on these species or on humans.

Surfactants are added to certain herbicides. Surfactants may have significant effects on wildlife species including fish and amphibian species, but these effects were not adequately disclosed or analyzed.

The DEIS apparently failed to address important scientific literature and failed to disclose that unassessed surfactants can be more toxic to many species than the active ingredient in a pesticide formulation.

At no time are the effects from all chemicals in the full formulation of the full herbicide mix, including adjuvants, assessed, nor are any of the other potential forms of exposure assessed.

12.10 Expected impacts to aquatic and amphibian species are fully described in Section 4.B.2.b and 4.B.3.b of the FEIS using impact assessment methods derived from the EPA and USFWS regarding herbicide concentrations. See also Response 9.50.

12.11 See Responses 9.50, 12.7, and 12.10.

12.12 Your opinion is noted.

12.13 The FEIS fully discloses and assesses impacts of the proposed application of herbicides. See Responses 7.5 and 12.6.

12.13 cont. The herbicides being proposed are not being applied separately from any other chemicals. It appears that inert ingredients and adjuvants can be, and often are more toxic than the active ingredients and thus need to be fully disclosed and analyzed as to their potential for adverse impact.

The DEIS apparently failed to take a hard look at potentially significant cumulative effects from the active ingredients, inert ingredients, adjuvants and breakdown compounds of the herbicide's full formulation on potentially sensitive species.

The S-CNF's Weed DEIS, apparently without taking a hard look at the potential cumulative adverse impacts of herbicide spraying, then assures the public that the aquatic resources, species, surface water and groundwater will be fully protected by application of BMPs. (DEIS at 4-103, 105: 4-14) The DEIS acknowledges that "aerial spraying ... perhaps represents the greatest potential to expose aquatic organisms and amphibians to contaminants either through direct application or wind drift." (DEIS at 4-27) Again, the S-CNF DEIS maintains that BMPs would protect the aquatic resources, (4-28).

The DEIS states that, "the Forest Service (2001a) concluded that no synergistic effects from herbicide application would occur. This was because: 1) the EPA currently supports an additive model in predicting synergistic effects, ...". (DEIS at 4-30: see also L-19)

The DEIS's Programmatic Biological Evaluation (DEIS at L-1 to L-20) apparently presumes that adverse effects from weed infestations will cause more harm to sensitive and T&E species than the herbicides could potentially cause. The BE alleges that benefits from the reduction of noxious weed infestations through the Proposed Action Alternative "... would be especially important to salmonids with narrow habitat requirements ... such as westslope cutthroat trout, ... bull trout, and the Snake River steelhead, spring/summer chinook salmon, and sockeye salmon. Benefits from the Proposed Action could contribute to the recovery and well-being of those sensitive and protected fish species." (DEIS at L-17)
The BE goes on to say that application of BMPs and "application of herbicides in accordance with EPA registration label requirements and restrictions" will likely mitigate any potential problems.

12.14 cont. While the DEIS indicates that the ESA and EPA requirements will provide further safeguards for listed and sensitive species, the S-CNF Weed DEIS failed to disclose that a Federal District Court recently ruled that the EPA had violated the Endangered Species Act by failing to protect salmon from pesticides:

On July 2, 2002, the U.S. Federal District Court in Seattle ordered the U.S. Environmental Protection Agency (EPA) to take action to protect Pacific salmon from pesticides.

The court found the EPA has a legal obligation under the federal Endangered Species Act to review the impacts of pesticide use and curtail uses that are harmful to salmon. This process begins with a consultation between EPA and the National Marine Fisheries Service (NMFS), the expert U.S. salmon agency.

12.14 During ESA consultation for the 2002 proposed weed treatments, the NMFS did not discuss this referenced court ruling nor did they prohibit the use of herbicides in weed treatments on the S-CNF in their concurrence on the Biological Assessment. The referenced federal court ruling is irrelevant in this FEIS. A Biological Assessment in connection with this FEIS has been prepared in consultation with the USFWS and NMFS. The Biological Assessment fully addresses and analyzes potential project effects on TES. Potential project effects on Forest Service sensitive species (which includes all MIS) are evaluated in the Biological Evaluation contained in Appendix L of the FEIS. The S-CNF consults routinely, and on an ongoing basis, on all actions on the Forest that could potentially affect Federally listed plant and animal species as required under the ESA.

Jan 21 03 02:21p p.9

The court decision, issued by Judge John Coughenour, called EPA's "wholesale non-compliance" with its Endangered Species Act obligations "patently unlawful."

Earthjustice represented the Northwest Coalition for Alternatives to Pesticides, Washington Toxics Coalition, and the commercial fishermen's organizations; Pacific Coast Federation of Fishermen's Associations and Institute for Fisheries Resources.

EPA's own documents find that current uses for several dozen pesticides are likely to result in surface water contamination levels that threaten fish or their habitat. Additionally, water monitoring by the US Geological Survey detected fourteen pesticides in salmon watersheds at concentrations at or above levels set to protect fish and other aquatic life. Combined, the EPA's findings and the US Geological Survey detections identified 55 pesticides that pose documented threats to salmon.

12.14 cont.

The Court found that "EPA's own reports document the potentially significant risks posed by registered pesticides to threatened and endangered salmonids and their habitat", and that "it is undisputed that EPA has not initiated, let alone completed, consultation with respect to the relevant 55 pesticide active ingredients."

It is highly likely that the USDA Forest Service, the Regional Forester, and the S-CNF Supervisor were aware of the District Court's July 2002 ruling.

The DEIS elsewhere states that, "under the provisions of the ESA, federal agencies are directed to conserve endangered and threatened species, and to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats." (DEIS at 5-3)

We maintain that, since a federal court has determined that the EPA had not complied with the ESA and had not consulted with the NMFS as required, the S-CNF cannot demonstrate or assure that there will be no adverse impacts to sensitive and ESA-listed species from the Proposed Action's herbicide spraying program. The EPA's own documents appear to fly in the face of the FS's bald assertion that the herbicides will have no effect on salmon.

Please continue us on your mailing list for this project and please send us any future documents for your S-CNF Noxious Weed Management Program DEIS/FEIS in a timely manner when they become available.

Sincerely,

John D. [illegible]

[illegible],
President

Page 9

THIS PAGE INTENTIONALLY LEFT BLANK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

Salmon — Challis National Forest
APR 25 2003
RECEIVED

APR 16 2003

Reply to
Attn of: ECO-088

Ref: 01-081-AFS

Post-it® Fax Note 7671	Date	# of pages ▶
To Jenni Y.	From Diane	
Co./Dept. CH2	Co. S-CNF	
Phone #	Phone # 756-5562	
Fax # 345-5310	Fax #	

William Diage, Planning Team, Ecologist
USDA Forest Service
50 Highway 93 South
Salmon, Idaho 83467

Dear Mr. Diage:

The U.S. EPA has reviewed the draft environmental impact statement (DEIS) for the **Salmon-Challis National Forest (S-CNF) Noxious Weed Management Program (CEQ # 020458)**. We reviewed it according to our responsibility under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA).

Section 309, independent of NEPA, specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major federal actions. For further explanation of our EIS review responsibility, please refer to the *EPA's Section 309 Review: The Clean Air Act and NEPA.*

The proposed action includes aerial and ground-based herbicide treatments, and mechanical, biological, controlled grazing and treatment combinations to eradicate, reduce and/or slow the spread of noxious weeds and invasive nonnative weeds on more than 66,000 acres on the S-CNF.

Based on our evaluation, we have rated this draft EIS, EC-2, Environmental Concerns - Insufficient Information. Enclosed is an explanation of the EPA rating system. This rating and a summary of our comments will be published in the *Federal Register.*

We believe the following issues should be addressed in the final EIS.

Alternatives

The DEIS eliminates the Proactive Prevention Alternative suggested in public comments though the draft states that the major causes of noxious weed infestations are the very actions which this alternative would address. The EPA disagrees that the need to do a forest plan amendment and a further NEPA analysis is a basis for eliminating further consideration of this
13.1 alternative. The NEPA regulations require the consideration of a reasonable range of alternatives that would meet the stated purpose and need for the proposed action (CFR 40 1502.14 (a)).

Printed on Recycled Paper

13.1 The Proactive Prevention Alternative was seriously considered for detailed analysis. The rationale for its dismissal is clearly explained in Section 2.E of the FEIS. See also Response 2.1.

13.2 The EPA also disagrees with the draft's conclusion that although human activities may contribute to the spread of noxious and invasive nonnative species, these activities are beyond the scope of this EIS. The project purpose includes, "Prevent or limit the spread of established weeds into areas containing little or no infestation." The Purposed Proactive Prevention Alternative would address this stated purpose. Therefore, consideration of this alternative appears to be within the scope of this NEPA analysis, and the FEIS should further evaluate and consider this alternative.

13.3 For all three alternatives, the DEIS shows that 18,000 acres a year would be treated. However, if the same acreage is treated under each option, the FEIS should discuss why one choice is expected to be more effective in reducing infestation than another.

Herbicide Use

13.4 The EIS should also discuss the effectiveness of herbicides used on weed seed pods, which can be viable for more than ten years. According to the DEIS, repeated herbicide application is necessary for a long period of time, greatly increasing the risk to the environment. The FEIS should explain the environmental impacts of using herbicides and/or livestock grazing as weed treatment options, the mixing of different chemicals, and the effectiveness of repeated applications.

13.5 According to the DEIS, herbicides have been used exclusively in the past, the FEIS should include a discussion regarding why the Forest Service proposes to continue to use herbicides when, according to the DEIS, weed infestation has significantly increased since 1965.

13.6 The FEIS should 1) provide a strategy for prevention and early detection of invasion, and 2) discuss control procedures for each species and a time frame to achieve these management goals.

13.7 To help prevent the spread of noxious weeds, we recommend the Forest Service:

1. Ensure that equipment tracks and tires are cleaned prior to transportation to a non infested site.
2. Focus control efforts at trail heads and transportation corridors to prevent tracking of seed into un infested areas.
3. Attempt to control the spread from one watershed to another to reduce the likelihood that water could transport seeds.
4. Consider rerouting trails or roads around localized infestations to reduce available areas for spreading noxious weeds.

Other Comments

13.8 cont. According to the DEIS, there has been past monitoring on program implementation and measuring the effectiveness on target species. The results of the monitoring need to be included

13.2 The stated project purpose and need (see Section 1.C of the FEIS) are addressed in the concepts and implementation of Integrated Weed Management, in addition to the concurrent implementation of Best Management Practices and mitigation measures pertinent to individual Forest projects and authorized allocated Forest uses.

13.3 Tables 2-5, 2-6, and 4-8 compare and contrast the environmental impacts, effectiveness, efficiency, costs, and benefits of the alternatives, including the relative effectiveness of reducing weed infestations. The stated goals of the various alternatives also recognize the limitations and ineffectiveness among the alternatives.

13.4 Chapter 4 of the FEIS contains a full analysis of the various weed treatments proposed. Some herbicides (Tordon, Transline) have residual effects that have been effective on emergent seedlings. No herbicides are effective against ungerminated seeds. Follow-up treatments are often required to eradicate established infestations due to existing seed sources. No distinction is made between an initial treatment and a follow-up treatment. The mitigation measures (Section 2.D.3) and the site-specific implementation process (Section 2.C.6) are designed to minimize risk to the environment including sensitive resources. The effectiveness of applications will be evaluated through the implementation and effectiveness monitoring program described in Section 2.C.3 of the FEIS. The effects of mixing different chemicals were analyzed in models developed by the EPA and were found to be additive but not synergistic (see Section 4.B.2.b).

13.5 Past treatments have been effective where they have occurred (see Section 1.C.2 of the FEIS). The spread has outpaced the available treatment opportunities. This is reflected in the annual treatment of approximately 3,500 acres under the No Action Alternative, which represents existing conditions, as opposed to the annual treatment of 18,000 acres under a more effective weed management treatment program analyzed in this FEIS.

13.6 The S-CNF weed prevention strategy is included in Section 1.A.1, Integrated Weed Management, and in Appendix A: USDA Forest Service Region 4 Best Management Practices for Weed Prevention and Management of the FEIS. Control procedures for each species identified in this FEIS are described in Appendix C. Control strategies are included in the prioritization process and the site-specific implementation process. Management goals are described for each alternative and often for each Ranger District. Placing a timeline for these goals is unrealistic due to uncontrollable variables, such as funding, future rate of weed spread, treatment effectiveness, and District prioritization.

13.7 Your recommendations are noted. See Appendix A, Region 4 Best Management Practices.

13.8 See Sections 1.C.1 and 1.C.2 of the FEIS. See also Response 2.18.

13.8 cont. in the FEIS.

13.9 EPA requirements for drift control should be disclosed as well as a monitoring plan to determine compliance with Forest Service drift control requirements and what impact helicopter downdraft has on chemical drift.

13.10 The FEIS should provide more information on uninventoried weeds such as how will these weeds be treated under the management objectives and the priority listing presented in Section 2.C.2 of the DEIS; how many acres there are in the S-CNF; the significance of uninventoried weeds to the Forest Service's overall objectives.

13.11 Appendix A addresses Best Management Practices for noxious weeds but doesn't mention invasive nonnative species. Do BMPs apply equally to both categories or are they limited to noxious weeds only? If so, Appendix A should be modified to include BMPs for invasive nonnative species. Would this modify the preferred alternative if it is not applicable to the non noxious weeds?

13.12 Please explain the difference between control and containment. Table 2-2 shows that weeds on more than 25 acres would be contained while weeds on five to 25 acres would be controlled.

13.13 We recommenend the FEIS include a detailed, comparative discussion of the costs of various treatment methods, such as closing roads and changing grazing allotments. The final document should also disclose the cost of each alternative based on full funding and partial funding. These figures should be factored into the overall environmental impact analysis.

I apologize for the long delay of this letter. Thank you for your patience. If you have any questions regarding these comments, please contact me at (206) 553-6911or Dan Robison, PE, (509) 353-2707.

Sincerely,

Judith Leckrone Lee

Judith Leckrone Lee, Manager
Geographic Unit

Enclosures

13.9 As stated in Section 2.D.3.b in the discussion of management practices and mitigation measures, "All chemicals will be applied in accordance with EPA registration label requirements and restrictions." Effectiveness monitoring to assess the effectiveness of buffer zones will be established (see Section 2.C.3 of the FEIS).

13.10 The process used to prioritize and treat new infestations is fully described in Section 2.C.6 Site-Specific Implementation Process.

13.11 For the purpose of this FEIS, the Region 4 Best Management Practices contained in Appendix A are applied to non-native invasive species as well as state and county designated noxious weeds.

13.12 The definitions of controlled and contained are included under the priority descriptions in Section 2.C.2 of the FEIS.

13.13 The estimated cost of each alternative is included in Tables 2-5 and 2-6 and Section 4.D.4 of the FEIS. Activities associated with authorized land use allocations are not addressed in this FEIS (see Section 2.E). The cost analysis is based on cost per acre regardless of full funding or partial funding.